ELECTRIC RAILWAY JOURNAL

DAILY EDITION DAILY EDITION

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Chicago—October 11, 1912—New York

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Pittsburgh, Pa.

Electric Railway Journal

DAILY EDITION

Published at the Annual Conventions of the American Electric Railway Association and Its Affiliated Associations

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CHICAGO, FRIDAY, OCTOBER 11, 1912.

PROGRAM FOR TO-DAY

9:30 a.m. Closing Session of Engineering Association, Brown Room, Saddle and Sirloin Club.

The Scope of Engineering Accounting

The report of the committee on engineering accounting, presented before the joint sessions of the Accountants' and the Engineering Associations yesterday, includes a discussion on scientific management. The attitude of the committee is that it is really considering the subject of economical management in order that such methods of special efficiency as are revealed may be standardized by member companies. This is one of the newer committees in the association, and its work has been widened greatly from the consideration of shop accounting with which the researches were begun by the initial committee. In the details of methods as well as in the broader principles with which the report deals, the committee finds abundant opportunity for research with profitable recommendations, and its work is of such a useful character that each ensuing year should permit the compilation of material of increasing value. The scope of the investigations of this committee need not necessarily be confined to the questions of cost accounting and efficiency in the mechanical departments, but may be extended logically into other departments of a railway. No department is organized on a basis of such perfect efficiency that it cannot achieve still greater results. In order that a higher degree of efficiency may be attained in an individual man or department, however, present results require analysis as a basis for the completion of data of comparative effort and attainment. Such analysis can come best from the experiences of companies that are making systematic and determined attempts to establish better and more economical practices. The committee has done a good service by giving publicity to the economical methods instituted by the Boston Elevated Railway, and that company has supported the work ably by contributing a record of its results.

One-Man Prepayment Car

One-man operation of a prepayment car is a subject that is of particular concern to small companies. The paper by Mr. Inch, presented before the Transportation & Traffic Association yesterday, is an interesting account of his successful experiences with operation in Missoula, Mont., under this plan. Mr. Inch says that good service is provided under the conditions which he describes so fully. The problem of the small company, either one which is about to construct a line in a single community or one which has an established enterprise in a community affording a very light density of traffic, involves somewhat different questions from those that confront a larger property. A small company has neither the capital nor the earnings to make the improvements and extensions that a large company ordinarily makes from time to time. Its initial investment involves more of an experiment than the large capital outlay of the great city system. Its revenues and expenditures are measured by very small amounts, and the removal of a single industry from the community may make the difference in its annual return between profitableness and loss. These conditions encourage the introduction of the one-man car.

The advantages of one-man-operated cars may appear to rest wholly with the company, for the reason that expenditures are reduced by this method, but since there is a direct relation between revenue and service, that is not strictly the case. Where a company cannot vary the rate of fare on city lines and the increase in density of a traffic already light is slow, the need for a larger margin of return may be met by a reduction in the operating expenses. One trainman alone on a car who is of a little higher grade of ability may be of greater value to a company, and thus also to the public, than two trainmen of less capacity who ask total higher wages and thus call for greater operating expenses for each unit of the service rendered by the railway. If the rates of wages for service on one-man-operated cars were increased, as at Missoula, the tendency would be to attract a better class of men. If the elimination of one trainman on a car can be made to effect such a reduction in operating expenses that service can be afforded in a community where otherwise street railway facilities would not be provided, a community is to be congratulated if it secures a company to operate safely by this method.

Lengthening the Rush Hour

In the report of the committee on passenger traffic of the Transportation & Traffic Association reference was again made to the desirability of co-operation with the factory owners to arrange where possible for multiple reporting hours and thus increase the period during which the employees report for work. Under such a plan some of the employees of the establishments with which arrangements were made

would report at 7 o'clock in the morning, some at 7:30, and so on in accordance with whatever plan would work in satisfactorily with the plan of operation. Leaving time would in the same way be spread over a very considerable period, and in this way the rush hour would be very materially lengthened and the traffic proportionately reduced in intensity. The advantages to the railway company, both in reduction in number of cars necessary to handle the employees of any given factory and in the peak load upon the power house, are manifest. In most cases the arrangement would seem to be of distinct benefit to the employees also, as it would enable cars to make two, three or even four trips during the rush hour, and as it would be quite possible for factory employees to be provided with seats. Under conditions where they all go to work and leave it at the same time they are often lucky if they get a chance to ride at all. When this subject has been taken up with the factories, however, there has been opposition to it, not on the part of the owners, but by the employees themselves. It is hard to tell whether this feeling is due to an unreasoning fear that the plan is intended in some way to be an extension of the working hours or because it is thought that different working hours would disarrange the domestic routine in families where some of the members work in one factory and some in another. At any rate, the advantages of the plan from the railway standpoint are so manifest that we hope the committee on passenger traffic for the next year will again take up the subject and bring it to the attention of the various member companies.

Training of Trainmen

Employees of the transportation department are the agencies by which the company receives nearly all of its gross revenue. In turn the company pays these employees a large proportion of the money it receives. Both revenues and expenses of the company, therefore, are concerned in the success with which the transportation employees do their work. For these reasons the subject allotted to the committee on training of transportation employees, treated in the report before the Transportation & Traffic Association yesterday, is of financial importance and is of such vital concern to the various properties that it should receive widespread consideration.

The report made by the committee is a very careful study of existing practices by members who are specially qualified to write on this subject. It is to be regretted that more companies did not take pains to reply to the thorough letter of inquiry issued by this committee. If they had understood the exhaustive nature of the inquiry and the benefit of full returns to the industry, they probably would have done as the committee requested.

The report indicates that there is a lack of complete information in compiled form in the records of some companies concerning the length of service of trainmen. The figures presented in reference to the short periods of service show a condition which calls for action on the part of companies whose records in this respect are not satisfactory. Short periods of service on the part of trainmen are due in part to unwise selection of men when applications are considered; that is to say, failure on the part of the responsible officials to consider the men with sufficient care. However, when it is seen that the thirty-six city lines which furnished data had a total of 30,296 employees, or an average of 841 apiece, and that these lines showed a total of 20,624 trainmen hired during the first year and 18,332 discharged or resigned in that period, it is clear that there was an average acceptance of about one or two men per line per day. Anyone who deals with a restricted number of employees in a highly organized business or department realizes the futility of an attempt to weigh men carefully in such a short time as this, unless the responsible official has subordinates gifted with extraordinary capability and judgment to determine the character of applicants.

These are the actual conditions with which companies are confronted. Some of the men who turn out in so short a time to be unsatisfactory ought to be stopped before they enter the service, both for their own good and for the good of the company. More care in selection and more care in supervision after the employee has begun should decrease the number of men who take up work of this kind when they are totally unsuited for it or when they do so in order to secure a job until they can find another more to their liking.

Report of the Committee on Way Matters

The report of the committee on way matters to the Engineering Association contains a number of subjects of vital interest to the maintenance of way departments of electric railways. Probably the most important subject is the recommendation that standard sections for 9-in. and 7-in. girder-grooved and guard rails, as approved by the committee, be adopted by the association. The 9-in. girder-rail section is the same as submitted by the 1911 committee, but the other sections have been developed by the 1912 committee after careful consideration. These recommended sections embody the best modern practice in design, and it is to be hoped that the association will act favorably on this phase of the committee's report. The adoption and use of these standard sections will enable the mills to make quicker deliveries and give the smaller roads the benefit of the experience of the larger ones.

Another important subject which has been taken up with the American Society for Testing Materials is the specifications for open-hearth girder and high T-rails. Although the rail employed in street and interurban railway construction at the present time is not subjected to the enormous stresses which come on rails of high-speed steam roads, the urgent need of a rail which will give a maximum life should be evident to all. It is estimated by those who know that less than 1 per cent of the total rail tonnage purchased by electric roads has been subject to their own specifications and inspection. The revisions made by the society do not affect the rail composition but reduce the tolerances, which is a step in advance. Several of the larger companies have purchased rails under the specifications as drafted by the 1910 committee. The rail received as a result of using the specifications in the preliminary form was very satisfactory. In every case the quality was found to be more uniform, and the manufacturers found no difficulty in complying with the requirements.

In preparing a design for joint plates for the 9-in. and 7-in. girder-grooved and guard rails, the committee has taken another step in the right direction. Our only regret is that the press of work prohibited the preparation of rigid specifications covering the composition and manufacture of joints. At present the rail-joint requirements are largely left to the manufacturers, and the result is one that conforms to the old quality of rail, which is too soft to stand the bending action coming to it under heavy loads. In order to reduce the number of low joints, it is necessary not only that they should be properly designed but the composition must be known, otherwise the design is a failure. In many cases, low joints are not wholly due to a faulty foundation, but as a result of it the weak joint is kinked and it is impossible to resurface the track at that point.

An important phase of the committee's report will be found in the use of titanium, manganese and nickel-chrome alloys in the manufacture of steel. The subject is new to the association, and the use of alloys in steel is comparatively recent, but the practice is becoming more and more popular each year. This study has a direct bearing on the future preparation of specifications for the manufacture of all kinds of steel and iron. Sufficient time has elapsed to demonstrate the increased wearing qualities and tensile strength obtained by using the alloys either as a scavenger or a component part of the finished metal. It therefore resolves itself into a question of whether it is better to pay the increased first cost and obtain the economical results possible in its use.

Conventionalities

Goodby everybody!

Who is this R. M'Geddon we hear so much about?

Not knocking Chicago—but à bas with such weather as that of yesterday!

McQuiston knows what to do when he loses his best trousers. He gets into Busch's.

The Big Steer Restaurant, opposite the Convention Hall, is not the only big steer around here.

Our baseball editor, Boston Brush, says that the Red Sox have the unanimous support of the Blue Stockings.

As an example of the right man in the right place we note that Captain Hogg runs a hotel at 4169 Halsted Street.

The Long and Short of the Illinois Traction are with us in the person of M. L. Harry, of Decatur, and Frank Bedard, of Peoria.

C. E. Flenner, of the Aurora, Elgin & Chicago, and Mrs. Flenner toured in from Wheaton and made a round of the exhibits Thursday.

An occasional contributor dropped this on the Conventionality editor's desk: "Don't you know that C. W. Raynor is the guy that put the sure in surety?"

'Nother free ride to-day. The Aurora, Elgin & Chicago is giving the party. Details elsewhere in this issue and free transportation to be had at space 61.

Why do they call L. P. Sawyer "Deacon"? He doesn't look particularly like a deacon to us; maybe it's one of those things that the highbrows refer to as an antithesis.

Well! Well! We have with us the large and genial George H. Tontrup, of St. Louis, Mo. Although late in arriving, he is making his presence felt and heard in the Brill space.

"No, dear," said a mother who was showing her daughter through the exhibition, as they passed the Indianapolis portable electric welder, "I don't *think* there are any animals in that cage."

A number of lady guests have asked the DAILY to thank the Manufacturers' entertainment committee heartily and publicly for the good times the ladies have had at this year's convention.

By the simple process of extricating an "o" and slipping an "s" into the name of R. E. Moore, of the G. E., the cause of his sad expression, heretofore existing in the realm of obscurity, is fully explained.

Awesome fireworks are those out in the open where electric-arc welding is being demonstrated. The demonstrator wears a goggle-eyed hood that would fit in well with tales of the Gloomy Headsman of medieval romance.

Cross-bars worn above the badge on the northeast corner of the thorax are the marks of distinction at this convention; but what are they to the crimson badges that flaunt from the manly bosoms of the members of the Illinois association?

The power of the press is again illustrated in the number of motormen and conductors attending the show, following the publication in the DAILY of the celebration of J. M. Roach's rise from the rear platform to the presidency of the Chicago Railways.

No, Reginald, that cheer that burst forth in the arena about 3:15 (our own Chicago time) was not due to an announcement that street railway fares had been raised to 6 cents, but to the posting of the news that the Giants had won a ball game.

A secret society pin has been found by C. W. Ketteman, and may be claimed at the Ohmer Fare Register Company's booth, No. 501. Mr. Ketteman did not inform us whether it was a Barfly emblem or the official badge of one of the paint and powder fraternities.

The editors of the ELECTRIC RAILWAY JOURNAL wish to express to the editors of the *Brill Magazine* their keen appreciation of the excellent portrait and the accompanying sketch of our chief, James H. McGraw, which appeared in the convention issue of the Brill publication.

George A. Post got here at last. Up to yesterday it looked as though this convention was going to be denied the pleasure of showing Uncle George how welcome he is at the annual get-together—or at any other time. George A., Jr., is also on the job, together with Mr. Sauvage, inventor of the shim slack adjuster.

The action taken by the American Association at yesterday's session in furthering a careful investigation of the subject of electrolytic damage to buried metallic structures will be of interest in many cities. In Chicago this question has excited much attention from municipal authorities, street railway engineers, press and public this year.

The convention came near having another official pair of honeymooners yesterday when George Halderman and his bride walked in at the front door under the baseball score board. After one look at the baseball crowd George started back for the hotel, remarking that he coudn't see why every one started so. It was the score board, G. H., not any bridegroom, they were looking at.

Queer notions of justice they have out here in Chicago. United States Judge Kohlsaat yesterday refused to remove Samuel Insull as receiver of the Chicago & Oak Park Railway on the ground that the charges of the minority stockholder against Mr. Insull "were principally innuendo and suspicion." Doesn't the learned justice know that innuendo and suspicion are sufficient grounds for hanging a railway man?

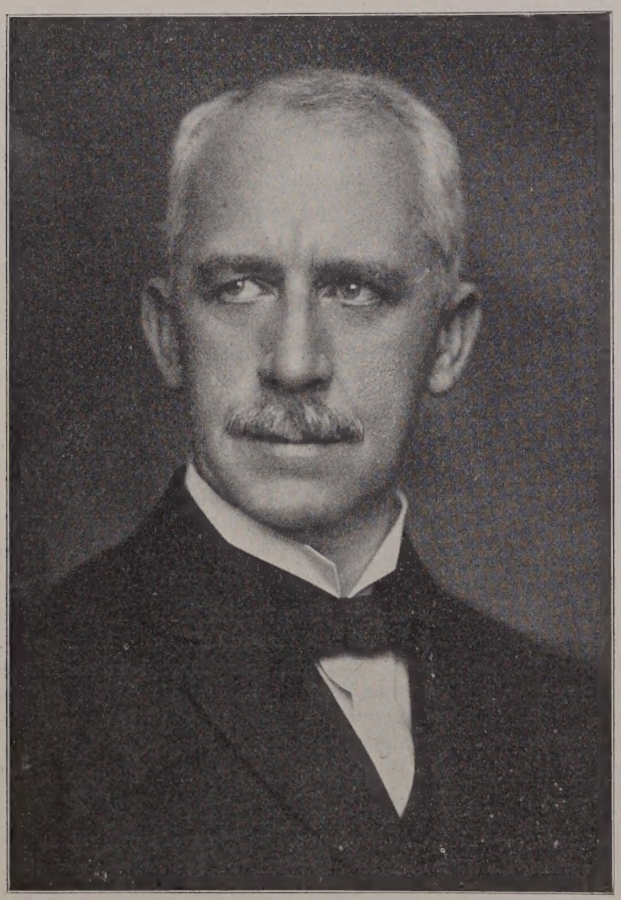
That well-known electrifier Raymond Hitchcock visited the show yesterday under the guidance of Dwight Dean. Mr. Hitchcock seemed to be particularly interested in slack adjusters, remarking that he thought he could use one on his voice. There was a party Wednesday night at the new Hitchcock play, "The Red Widow," and with a little prompting the comedian handed out some good ones to S. M. Curwen and others in the A.E.R.M.A. box.

At an informal meeting of purchasing agents present at the convention Thomas Finigan proposed the following resolution, which was unanimously adopted: "Whereas, judging by results accomplished, the Self-Constituted Association of Presidential Purchasing Agents is incompetent to perform its duties, and whereas it has paid excessive prices for inferior goods, which in many cases were not delivered at all, therefore, be it resolved, That the purchase of future presidential candidates be vested in the duly constituted body of American Electric Railway Purchasing Agents, with full power to act, subject to the advice and consent of the affiliated Benevolent Order of Barflies."

Here is one that is told on "Ed" Mason, of the Electric Service Supplies Company. Mason had been trying for a long time to get some business from President Gonzenbach, of the Sheboygan Railway, but there was nothing doing until Mason showed up in the harbor one day in command of a naval militia gunboat, fired a salute and sent his orderly ashore to invite the railway man to lunch. Luncheon was followed by more honors, bugles, dress parades and salutes, until when President Gonzenbach got ready to go over the side there was really nothing for him to do but tell Commander Mason that the order was his. What made it easier was that the railway man has martial leanings. Of course Mason didn't know that.

GENERAL HARRIES

A man of wide and varied experience, broad views and a comprehensive knowledge of men and affairs, Gen. George H. Harries, the new president of the American Electric Railway Association, is well equipped to fill the important position to which he has been chosen. For several years he has untiringly given a great deal of his time to its interests, particularly as chairman of the committee on federal relations, for which service General Harries' wide acquaintance among prominent government officials in Washington has made him especially fitted. General Harries has been a vice-president of the association for the past three years and as first vice-president this year has presided at all of its sessions. For many years he attended the convention of the association as a delegate from



Gen. George H. Harries, Elected President of the American Electric Railway Association

the Washington Railway & Electric Company, of which he was vice-president. Last year he disposed of the greater proportion of his interests in that company and became associated with H. M. Byllesby & Company, and he is an accredited representative at the convention from the Arkansas Valley Railway, Light & Power Company, Pueblo, Colo., the Fargo & Moorhead Railway Company, of Fargo, N. D., and Moorhead, Minn., and the Fort Smith (Ark.) Railway, Light & Power Company, of all of which companies he is president. Representing the Byllesby organization, General Harries has also large light and power interests in and near Minneapolis, St. Paul, Louisville and other cities.

Born in Wales in 1860, General Harries received his early education in that country. While still a boy he removed to the Canadian Northwest, and he spent several active years in the army on the plains and in the mining regions, thereby becoming familiar with the habits of many Indian tribes. In 1891 his experience was notably recognized by President Harrison, who appointed him a member of the Sioux Commission. In 1897 he was commissioned brigadier-general by President McKinley and assigned to command the brigade of the National Guard of the District of Columbia, a federal command. He still holds this commission, which involves the defense of the national capital. He commanded a regiment of infantry at Santiago de Cuba during the campaign of 1898.

A fact which might also be mentioned in connection with his military record is that General Harries has a national reputation within and without the service as a champion marksman with both rifle and pistol.

As a newspaper man General Harries has had wide experience. Indeed, it is to this work that his railway connections may largely be attributed. As a reporter on the *National Republican* in Washington, D. C., he made a study of railway conditions in that city which led to his leaving the newspaper field in 1895 to become president of the Metropolitan Railroad Company of Washington, and in 1900, upon the organization of the Washington Railway & Electric Company, he became its vice-president. In civic matters General Harries has also occupied a prominent position. For twelve years he was honorary secretary of the Washington Board of Trade, a body which in 1908 he served as vice-president and for the two last years of his residence in the East as president.

General Harries has also been active in national societies connected with public service industries. He has just retired as president of the Association of Edison Illuminating Companies and is a member of the important public policy committee of the National Electric Light Association, of which body he has also been treasurer. He is an associate of the American Institute of Electrical Engineers, a member of the Illuminating Engineering Society, the Washington Society of Engineers and the Washington Academy of Science.

General Harries' long residence at the national capital, combined with his ability and *savoir faire*, have enabled him to make friends of many men prominent in public life, and the street railway and electrical interests have always found in him an untiring and tactful champion.

AN INVITATION FROM MR. FABER

The Aurora, Elgin & Chicago Railroad Company extends to the members and delegates attending the convention an invitation to take a trip over its line from the terminal in Chicago to Aurora and return to Chicago. A stop-over of ten minutes will be made at the company's Batavia power house on the return trip.

A special train will convey the party over the line. This train will leave the company's terminal station in Chicago, on Fifth Avenue, near Jackson Boulevard, at 2 p. m. to-day and will consume about three hours' time in making the round trip.

All those desiring to make the trip can obtain transportation, free of charge, by presenting the official badge to the representative of the railroad company at the booth of the Illinois Electric Railways Association, No. 61. It is requested that applications for transportation be made as early as possible so that ample accommodations can be provided for the party.

No one has a keener eye and greater enthusiasm for the exhibits than Albert Thode, of Albert Thode & Company, one of Germany's greatest electrical supply companies. The exhibit feature is practically unknown at German railway meetings, but "Elektrothode" would be just the man to introduce this valuable adjunct at home. Among other distinguished foneigners here are Messrs. Jellinck and de Fischer, respectively general manager and chief engineer of the Budapest (Hungary) railway, who are taking in the convention as a part of a "grand tour" of inspection of the electric railway systems in this country.

THURSDAY'S MEETING OF THE AMERICAN ASSOCIATION

Vice-president Harries called the meeting of the American Association to order at 2 p. m. yesterday and called for the report of the committee on compensation for carrying United States mail. T. H. Tutweiler, president Memphis Street Railway, presented the report, which appears in abstract elsewhere in this issue.

On motion the report was accepted.

C. L. S. Tingley, American Railways, called attention to the new parcels post law. He thought that in some cases this would make it a physical impossibility for companies to continue closed-pouch service on cars.

J. McMillan, Los Angeles, Cal., said that electric railways got the same rate for closed-pouch service as when it was carried by horse cars, and the Post Office Department had never had brought to its attention the fact that in communities like those through which the electric roads ran the public practically demanded that the mail be sent by the electric roads.

The next order of business was the report on taxation matters, which was presented by the chairman, Mr. Tingley. An abstract of this report is published elsewhere in this issue.

Mr. Tingley said that the committee on taxation matters was composed of a representative of every state in the Union, and, consequently, it was a committee of which it was almost impossible to get a meeting. There had been no meeting of the committee until last Monday, when a meeting took place at which ten members were present. The committee, however, through individual work had secured the data presented so that the report, while it had not been reviewed by a majority of the committee, was the work of the committee as a whole.

Upon motion, the report was accepted and ordered filed.

W. J. Harvie, J. G. White & Company, Inc., presented the report of the committee on joint use of poles, and, on motion, the report was accepted and ordered filed. An abstract of this report is published elsewhere in this issue.

Calvert Townley, New York, offered the following resolution:

"Resolved, That it is the sense of this meeting that cooperation between this association and others concerned looking to a reduction in the disputes and litigation over alleged electrolytic damage is desirable."

Mr. Townley spoke as follows in support of the resolution:

"Many of us have had electrolytic disputes in some locations, and those of us who have not had them are doubtless interested in watching their progress. It has, doubtless, been impressed upon the minds of many that there is a large amount of unnecessary disagreement over the elements of the question, over which there should be no disagreement. If an electric railway is attacked in this locality by another corporation having metallic installations, the first thing is to get expert advice on one side and then on another, and the experts will have different points of view, often having disputes among themselves; the newspapers add notoriety to it, and the public get the impression that the electric companies are to blame. There has been an informal discussion going on, started in the American Institute of Electrical Engineers, with a view to getting an expression of this association, the electric light association, the telephone people and gas and water companies as to the appointment of some sort of a joint committee to study the question and see whether or not they can formulate some basic principles of procedure to eliminate these controversies. If that committee should be suggested or appointed, the representatives of this association on it could, of course, approve or disapprove its findings, and it could be referred back to this association for such action as we think wise. In any event we would not be committed to anything and would be kept informed of all the proceedings going on. With a view to advising the members of this association of the procedure and giving our officers our views on it I have presented this resolution."

On motion the resolution was adopted and referred to the incoming executive committee for action.

C. N. Duffy, The Milwaukee Electric Railway & Light Company, read the paper of R. B. Stearns, vice-president, of that company on "The Milwaukee Fare Case,"—as Mr. Stearns was called to Milwaukee. An abstract of this paper is published elsewhere in this issue.

Mr. Duffy then presented the report of the committee on determining the proper basis for rates and fares. Mr. Duffy explained that the association in January referred this question to a sub-committee of three, composed of Mr. Ford, chairman; Mr. Bradlee and himself. This sub-committee had meetings in New York, and work was outlined for each of the members to undertake in the investigation. Unfortunately Mr. Ford was unable to come to Chicago and he asked Mr. Duffy to present the report. Mr. Bradlee also was disappointed in not being able to come. It was the intention of the sub-committee to present only a brief report at this time and to supplement this by later publication of memoranda prepared by the individual members. An abstract of the report as read by Mr. Duffy is published elsewhere in this issue.

Morrill W. Gaines, statistician Brown Brothers & Company, New York, then talked on "Electric Railway Securities." An abstract of the paper read by Mr. Gaines is published elsewhere in this issue.

W. F. Ham, Washington Railway & Electric Company, moved that a vote of thanks be offered Mr. Gaines for presenting the paper.

An address on "Automatic Rate Regulations" was then made by Oscar T. Crosby, president of the Wilmington & Philadelphia Traction Company. In introducing the speaker, the chairman said that Mr. Crosby had rendered notable service in behalf of the association in connection with the recent tour which was taken by President McCarter and his associates. For his activity on that trip the association was deeply indebted to him.

Andrew Cooke, of Cooke, Holtz & Company, Chicago, then made an address.

On motion of Mr. Crosby, a vote of thanks was extended to Mr. Cooke for his address.

Vice-president Harries, on behalf of the committee on federal relations, asked leave to print the report of that committee.

(Past-president Arthur W. Brady in the chair.)

The report of the committee on nominations was presented by Robert I. Todd, the chairman. It submitted the following nominations for officers and executive committee members for 1912-13:

For president, George H. Harries, president Arkansas Valley Railway, Light & Power Company; for first vice-president, Charles N. Black, vice-president and general manager United Railroads of San Francisco; for second vice-president, C. Loomis Allen, president Newport News & Old Point Railway & Electric Company; for third vice-president, C. L. Henry, president Indianapolis & Cincinnati Traction Company; for fourth vice-president, John A. Beeler, vice-president and general manager Denver City Tramway Company; for members of the executive committee, the officers and presidents of the affiliated associations.

The report of the committee on nominations was received and approved, and the secretary was instructed to cast a ballot for the nominees.

Chairman Brady then introduced General Harries, the president for the coming year. General Harries, in his characteristic manner, expressed his indebtedness to the associa-

tion and his keen appreciation of the honor of the election.

Chairman Harries read a telegram received from Mr. McCarter acknowledging receipt of the message of congratulation upon his recovery sent to him by the association.

REPORT OF COMMITTEE ON RESOLUTIONS

The committee on resolutions, consisting of J. J. Burleigh, chairman; A. W. Brady and John A. Beeler, then presented its report suggesting the following resolutions:

One of regret that President McCarter had been unable to attend this convention and extending its felicitations to him upon his convalescence.

One of thanks to the officers of the association and other members of the official family for their untiring efforts and unselfish devotion to the cause of advancing the welfare of the association.

One to General Harries for the courtesy extended by him and the efficient manner in which he had conducted the proceedings of the several sessions when unexpectedly called upon to preside.

One to the Manufacturers' Association for its helpful cooperation in the task of solving the problems which confront the industry, for its liberality and its interest in the industry, for its contribution to the expenses of the transcontinental trip last spring, for the personal part in that trip taken by President W. L. Conwell and Charles C. Peirce and for the comprehensive exhibit assembled at this convention.

One to the various committees for the time, labor and talent devoted to the several subjects assigned to them as well as for the able and interesting papers presented.

One to the daily and technical press for courtesies extended and expressing gratitude to the ELECTRIC RAILWAY JOURNAL and *Electric Traction*, especially to the former for its enterprise and manifestation of good will in providing gratuitously an accurate, comprehensive and altogether excellent daily publication of the proceedings of the convention.

One of thanks to the Saddle & Sirloin Club for its hospitality in placing its rooms at the disposal of the association for its sessions.

One acknowledging the courtesy extended by the railroads in and about Chicago to the members of the association.

These resolutions were severally adopted by unanimous vote.

Mr. Burleigh then presented the necrology of the association for the past year, with the resolution that, although the association recognized the inadequacy of words to convey its sense of loss, it recorded its sincere regret for the deaths that had occurred. This resolution was also adopted.

Secretary Donecker announced that the Aurora, Elgin & Chicago Railroad had invited the members of the association to participate in a trip over that railroad to-day (Friday). The party will leave at 2 p. m. and go to Aurora and return and will make a ten-minute stop at the car station. Transportation may be secured at space 62, Exhibit Hall, upon presentation of members' badges.

The convention then adjourned.

The report of the Compania de Tramways Electricos del Sud (Buenos Ayres) states that the gross profits for the year to June 30, 1912, amounted to $1,262,999, of which $1,085,192 was due to passengers and $173,918 came from the sale of a building site originally destined for the company's head offices. Working expenses amounted to $784,350, which, with general expenses and other charges, reduced the net profit to $345,541. The gross profits are $112,417 more than in the previous year, an increase of 12 per cent. The working expenses show an increase of over $70,373 over those of the previous year, mostly due to the increased cost of electrical power, the price of coal having been raised by the miners' strike. The total number of passengers increased from $6,690,660 in 1910-11 to $7,507,976 in 1911-12, an increase of 12 per cent, the passenger fares increasing at the same time by 13 per cent from $935,889 to $1,060,284.

THURSDAY'S JOINT SESSION OF THE ENGINEERING AND ACCOUNTANTS' ASSOCIATIONS

The joint session of the Engineering and Accountants' Association was called to order yesterday morning at 10 o'clock. President Ackerman of the Engineering Association and L. T. Hixson, first vice-president of the Accountants' Association, presided. The first report read was that of the joint committee on engineering accounting. The report was presented by F. B. Lasher, New York State Railways, co-chairman. The report is published elsewhere in this issue.

J. P. Barnes, Utica & Mohawk Valley Railway, spoke of the great importance of keeping full detail costs of shop work and other departmental expenses. His company had found that by doing so it has been able to try out different shop methods and reach a very accurate comparison as to the efficiency of those methods. While it had not gone into the work that was generally described as "efficiency engineering," it had been able to apply some of its fundamental principles and through them had obtained results that would have been impossible without detailed costs.

M. J. French, Utica & Mohawk Valley Railway, testified to the same effect as regards the way department. As a rule, the timekeeper and foreman in the way department were responsible for the accounting; that is, as to the actual cost of the work performed, but he believed better results could be secured if this work should be taken up by the auditing department. The job order system originated with the auditors, they were thoroughly familiar with it, and they had taken the distribution of accounts out of the hands of the way engineer. Mr. French said that he would like to hear from some of the companies in which this work had been taken into the auditing department, to learn what results had been obtained and whether the way engineers were satisfied with the way in which the auditing department handled the work.

C. H. Clark, Cleveland Railway, said that on Jan. 1 of this year he quietly transferred the timekeepers to the auditor's department. The work orders originated in the engineer's department, which decided what work should be a division of expenditures, like grade crossing work, where the ordinance prescribed the terms. If the timekeepers did not report the work correctly, the auditors were responsible after they had had their instructions written out. Mr. Clark found that to put the timekeepers under the auditor relieved the auditor of a good deal of work.

W. G. Nicholson, Omaha & Council Bluffs Street Railway, said that that company had experienced difficulty in keeping account of the correct time. At present the timekeeper reported to the accounting department. He reported his time daily on all the work. One copy of the report was given to the accounting department and a duplicate copy was sent to the engineer of maintenance of way so that if there were any inaccuracies he could check them.

J. D. Evans, Montreal, said that the timekeeping was handled by the auditing department, but the distribution was not so extensive as was desired, so the engineering department had its own men distribute and keep the unit cost. He had young college men to be with the gangs and figure the unit costs. The system worked so well that he knew the unit cost of each job. In his experience with electric railways he had found only two electric railway systems out of fourteen which were advised of their unit costs promptly. Now, in addition to the unit costs, he wished to be advised promptly of the total costs. The unit costs might be running very high for some reason or

the engineers might have underestimated the costs, and by working together with the unit cost and the probable final cost and total daily costs, he had in many cases reduced costs much below what were anticipated in the beginning of the work. Maintenance of way engineers should give more attention to unit costs.

George L. Wilson, Twin City Rapid Transit Company, said it had been the practice in that company to have the expenses of the maintenance of way department, the timekeepers of which were under the control of the auditing department, report directly to the auditing department, but these timekeepers were also, so far as the division of the work was concerned, under the direction of the engineer of maintenance of way. That department received constantly accurate figures as to the unit costs, but did not get them quite so promptly as it would like. In order to know how things were running, it had been the practice to have a cost clerk look after the expenses as the work progressed, so that while the work went on the individual costs could be known. After the work was completed the auditing department sent the way department complete information regarding it. He thought this could be carried out with a good deal more detail. If a cost clerk, or some one familiar first with the method of timekeeping and then possibly with the details of the methods of carrying out the work was secured and kept on the job, permanently if possible, his experience was worth more the second year than it was the first year; he improved, and the results which he secured were worth more. The timekeeping could be handled to better advantage by the auditing department. However, the engineer of maintenance of way should be the authority to decide as to the division of the expenses.

H. H. Adams, Ford, Bacon & Davis, said that the question of additional clerical force was a vital one. It had been his experience that comparatively little additional clerical expense was necessary to keep detailed cost accounts which would be of such great value in the reduction of the total cost that the amount of expense for clerical labor was insignificant compared with the total saving.

T. B. McRae, Metropolitan West Side Elevated Railway, Chicago, was in favor of keeping all the time accounts and other accounts in the auditor's office. He had known of cases where there was a distribution of expense through a large number of accounts to cover up certain expenses which were excessive. When the time slips were received at the auditor's office, and the work was done by the auditor or some one disinterested the figures were reliable.

Mr. MacRae was also interested in the question of costs of power. His classification showed: Maintenance of way, maintenance of car equipment, maintenance and operation of power plant equipment, and conducting transportation. The power plant expense was kept in a separate classification. This was done in order to avoid confusion between the cost of maintenance of the electrical equipment of cars and of power plants. The accounts were designated by titles of department heads, as "engineer of maintenance," "master mechanic," and "engineer in charge of power house." At the end of any given period the company knew exactly what each department cost.

M. R. Boylan, Public Service Railway of Newark, said that his system was very similar to that outlined by Mr. MacRae. The timekeepers of the track department were generally under the direction of the accounting department and maintenance of way department. The job orders were filed in the office of the engineer of maintenance of way. They were forwarded in the usual manner to the general manager's office and finally were filed with the auditor, who forwarded monthly to the engineer of maintenance of way a detailed statement of the cost of all jobs, construction as well as operating. In addition to that he had a permanent job order for every building, every street and all the overhead work. These charges were posted monthly to the permanent job order and the engineer of maintenance of way, and the general manager could see at a glance what it cost to maintain a certain piece of track in a certain locality. The same practice applied to buildings and lines. This system had been in force for seven or eight years and was very valuable, particularly when a question was asked as to the time of renewal of a certain piece of track. In the case of repairs to cars the job order was issued by the mechanical department practically in the manner outlined, and the charges were forwarded monthly to the auditor's office, giving a record of all expenses on each job order. When the job was completed the final report was sent showing the cost of that particular job; in other words, the heads of departments were informed weekly of the various charges to maintenance and construction accounts, and complete details were sent monthly. A job order record was also kept in connection with manufacturing and making up material and supplies for the storekeeper.

M. W. Glover, Mobile Light & Railroad Company said that Mr. MacRae's suggestion was provided for by the report, which recommended a separation of the cost of maintenance of power plant from the maintenance of rolling stock, and also of the operation of power plant from conducting transportation. He hoped the classification committee would follow the suggestion of the committee.

Mr. Barnes said that in connection with the question of the subdivision as between power plant equipment and rolling stock equipment, it might also be well to make a similar subdivision in the way account, between the electric line accounts and the supervision of electric line, as distinct from the track work. Such a classification might be of distinct value. The job order system outlined by Mr. Boylan was very similar to the practice of the companies with which he was connected, and he found it of the greatest convenience to have the issuance of the job orders under the control of the heads of departments. If the head of the department felt that he was not getting as much detail as he would like to have, all that was necessary for him to do was to issue enough job orders to cover the various points on which he wanted information and he would get complete information from the auditor.

John Sibbald, Fonda, Johnstown & Gloversville Railroad, said that the scheme of the Public Service Railway of Newark, outlined in the report, asking the motorman to save power by coasting and by proper operation of the controller, was so inexpensive that almost any company could adopt the system, and his company did so. While he had no way of measuring the benefits received, simple observation indicated that a smoother operation of the cars was secured. There was an effort on the part of the motorman to make excellent stops, and he was very much in favor of the idea. It cost very little and impressed the men with the importance of saving the power.

The report of the committee was received and approved.

COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY

L. T. Hixson, vice-president of the Accountants' Association, called for the report of the committee on life of railway physical property. This was presented by Martin Schreiber, Public Service Railway of Newark. An abstract of this report is published elsewhere in this issue.

Mr. Schreiber explained, on behalf of the committee, that in making the report the committee not only formed its own conclusions and opinions but also sent out fifty letters. It divided the subject into five divisions, each division representing the work of a standing committee of the Engineering Association, and then selected ten men in each of those divisions whom it considered eminently fitted to express an opinion on the life of that portion of the railway property on which they were questioned. The committee expressed its appreciation of the work of the gentlemen who co-operated with it in this way and of the many interesting letters and the information that it received from them.

R. F. Kelker, Chicago, Ill., said that if the association had information at hand that could be used in making an accurate determination of value it would have a fine record that could be used as a check. The data would permit a clearer idea of the various portions of the property and make it possible to perfect arrangements to take care of necessary renewals. They would furnish facts as records and not merely estimates. He thought the report should be referred back to the committee for continuation of the study of the subject as suggested by the committee.

Fred G. Simmons, Milwaukee, Wis., said that while he was not connected with the street railway interests at the present time he had had experience in the business for a good many years and had come intimately in contact with the valuation of one of the large companies of the country by a state commission. In his opinion the committee was right in the position taken. He did not believe that it was possible to fix the life of any car definitely. In testimony on the valuation of properties in Wisconsin, as particularly applied to The Milwaukee Electric Railway & Light Company's property, the evidence given by the various heads of departments was based on their own analyses of the average life of the physical property of that company; that life would vary in each different section of the country and in cities of varying size and under many other conditions. He did not see how it would be possible to strike an average for the general members of the association. He thought, however, that by assembling all the available data from such valuations as were made in Milwaukee and many other points throughout the country, and possibly tabulating, or at least indexing, those, so they could be secured by the various member companies, the greatest amount of good could be done. The general averages fixed in Milwaukee applied only to Milwaukee conditions and not even to the conditions in the cities surrounding Milwaukee.

Mr. Adams said that the question of striking an average value was a very difficult one, particularly at the present time, on account of the changes in equipment. No one knew what the life of the cars of to-day or the life of the motors of to-day was going to be. The form in which the committee had outlined the work was, he thought, one that the association could well afford to follow in the future.

W. F. Ham, Washington Railway & Electric Company, approved thoroughly of the method which the committee had followed in prescribing some standard classification of physical property. This was a very important field of work for the two associations. The fact that there were great difficulties in determining facts should not discourage the associations in the effort to obtain whatever information was procurable, because this was a subject that received judicial consideration, and it was necessary for some one to state what the depreciation on the property was. It would take many years to accumulate reliable and valuable data and yet on certain items covered by the classifications there might already be data of value. Probably all had an idea of the average life of a car under different conditions. An engineer must have some idea of the relative life of an untreated tie and a treated tie. By following this for years, as would be necessary, the time would come when there would be something of value. In the study of depreciation the associations should eliminate entirely the question of obsolescence because obsolescence and depreciation were absolutely different. The life of the property was the normal life, if not thrown away, and correct accounting would differentiate between obsolescence and depreciation.

Mr. Wilson spoke in favor of the recommendations of the committee. There was a great deal to be learned about the question of the life of the equipment of electric railways, and there was certainly no better method of getting at it than by keeping records and getting all the information possible.

Mr. Schreiber, referring to the list in the report, asked if anyone wanted to suggest changes. In answer to questions, he said that shop tools included all machinery connected with the shop. Wiring would be electrical equipment. The heating plant would be part of the building.

Mr. Boylan said that, in reference to the equipment, there might be a subdivision under "car bodies" as between wood and steel bodies.

Mr. Schreiber said that would be a good suggestion. He did not believe the committee took that into consideration. On the other hand, there was a combination of the two, so that made it a question whether car bodies alone would not be better, because there might be steel or wood bodies or a combination.

Mr. Boylan said there might be three subdivisions to meet these conditions.

Mr. Barnes said that the difficulties of maintenance of a steel body were entirely different and separate from the difficulties of maintenace of a wooden body. It seemed to him that the two ought to be considered separately.

Mr. Schreiber said that under "power distribution" the committee did not provide for "shop and tools," considering that they would be under tools and equipment and not necessary under power distribution.

Ralph H. Rice, Chicago, Ill., said he could not discuss the matter as he had just heard it, but it occurred to him that there was a distinction between "feeders" and "cables."

C. L. S. Tingley, American Railways Company, asked if concrete poles should not be included.

Mr. Boylan thought that transmission lines should be covered also.

Mr. French thought that under present methods a great many state commissions were classifying bonds as part of the distribution system rather than the track system.

Mr. Boylan said that under the distribution of his company the bonding was done by the line department, and he thought it should be placed there.

Mr. Simmons thought that the matter of bonding was open to question. His opinion was that more of the large systems took care of the bonding in the track department than in the line department.

A member said that when the questions were sent to the companies an inquiry should be made regarding climatic conditions, which had a bearing on the life of property.

William Roberts, Northern Ohio Traction & Light Company, referred to a case where two types of motors were pointed out to him as obsolete. He said he would take the motors out and try them in relation to the particular road, and then he found that they were the best motors that the company possessed for its particular requirements.

Mr. Schreiber said that the great problem was that no one could say what changes would take place in ten or fifteen years, and no one could anticipate catastrophes.

Mr. Roberts said that another consideration was that equipment that would last indefinitely on one system, under certain track conditions, might not last very long under other conditions.

Mr. Ham said that unless the associations were going to set themselves up as good guessers, the only thing to deal with was depreciation. Obsolescence might be general in character or local. Who could have said, when horse cars were used, that the time would come very shortly when everything connected with the equipment would be discarded? Would it have been proper for the horse car operator in those days to include in his expenses a fund sufficient to take care of the entire loss of his investment, which he could not foresee and no one else could foresee?

Mr. Adams moved that the report be accepted, that a vote of thanks be extended to the committee and that the committee be continued for a further investigation of the subject. The motion was seconded and carried.

This completed the program of the joint session.

THURSDAY'S JOINT SESSION OF THE TRANSPORTATION & TRAFFIC ASSOCIATION AND CLAIM AGENTS' ASSOCIATION

The joint session of the Transportation & Traffic and the Claim Agents' associations was called to order yesterday morning at 10:20 o'clock by Vice-president Brush of the former association. The reports of the two committees on training of transportation employees were then presented. They are published elsewhere in this issue.

In the discussion the conclusions of the committee of the Transportation & Traffic Association were first considered. The first, or that relating to the selection of employees, was accepted. The second conclusion, relating to methods of instruction, was also approved. The conclusions on supervision, selection and annual adjustment of record were also accepted.

Under "Welfare," paragraphs (a) hours of service for regular men, (b) relief crew, (c) selection of runs and (e) surroundings were duly approved; but paragraph (d), extra men, was changed to read as follows: "Extra men should work on a rotating daily list." All of the recommendations under "Supervisory Force" were next considered and indorsed.

Upon motion the joint report of the Claim Agents' Association was adopted.

F. S. Hughes, who is conducting a campaign for the Public Service Railway, New Jersey, on accident prevention, then showed a large number of colored slides, as prepared for use in talks to trainmen and school children.

(The claim agents then retired to their final session).

The report of the committee on schedules and timetables was adopted as amended.

PREPAYMENT CAR OPERATIONS

The next order of business was the paper by S. R. Inch, Missoula Street Railway, on "One-Man Prepayment Car Operation." Upon Mr. Inch's suggestion the paper was read by title only, because of the lateness of the hour.

C. D. Emmons, Southern Michigan Railway, asked Mr. Inch how he took care of railroad crossings with one-man operation.

Mr. Inch replied that it was incumbent upon the motorman to make a positive stop. At any point where there was a descending grade to a railroad crossing the rules called for two positive stops, one at the top of the grade and one about 30 ft. from the grade crossing. He had two grade crossings and had had no trouble so far.

Edwin C. Faber, Chicago, then presented the following report of the committee on resolutions::

"The committee on resolutions appointed by your president has pleasure in submitting the following report:

"Whereas the flourishing condition of this association testifies to the devoted skill of the officers and committees of this organization, and

"Whereas the entire program arranged for the benefit of our members clearly indicates the conscientious efforts of the members of your executive committee in the selection of useful and interesting subjects, and the reports as presented have evidenced energetic work on the part of each one of the members of the different committees, now, therefore

"Be it resolved, That the members of the transportation and traffic committee beg leave to record their grateful appreciation of the faithful, efficient, conscientious way in which Mr. McCarter, president of the American Association; Mr. Shannahan, president of the Transportation & Traffic Association; Secretary Donecker, the officers and executive committee members and members of the fourteen standing and special committees of this association have executed the duties imposed upon them.

"Be it further resolved, That the hearty thanks of this association be tendered the American Electric Railway Manufacturers' Association for its long-time and growing co-operation in our work, for its highly successful contribution to the success of this convention and for the spirit of helpful good fellowship displayed by its members on all occasions.

"Be it further resolved, That the president on behalf of the Transportation & Traffic Association assembled send to Mr. McCarter a telegram expressing regret at his inability to be present and wishing for him speedy and complete recovery.

"Be it further resolved, That the thanks of our membership be, and they are, hereby tendered to the Saddle & Sirloin Club for the use of their rooms for the holding of our meetings. E. C. Faber, E. F. Peck and L. C. Bradley, committee."

Upon motion by M. C. Brush the committee's report was adopted.

ELECTION OF OFFICERS

The next order of business was the report of the nominating committee, J. K. Choate chairman.

Mr. Choate then offered in nomination as officers for the coming year the following: President, Dana Stevens; first vice-president, D. A. Hegarty; second vice-president, M. C. Brush; third vice-president, H. A. Nicholl, and secretary, H. C. Donecker; for members of the executive committee, C. B. Buchanan, W. R. W. Griffin, L. C. Bradley and J. McMillan.

The secretary then cast a vote for all the officers proposed, after which the meeting adjourned.

REPORT OF THE COMMITTEE ON DETERMINING THE PROPER BASIS FOR RATES AND FARES*

BY FRANK R. FORD, CHAIRMAN; C. S. SERGEANT, C. N. DUFFY, WILLIAM J. CLARK, JAMES F. SHAW, E. C. FOSTER, H. G. BRADLEE AND R. I. TODD

Your committee on determining the proper basis for rates and fares, in answer to your instructions "to work out a theoretical basis for determining fares on properties having annual gross earnings (operating revenue) of from $100,000 to $5,000,000, considering each $100,000 earnings from $100,000 to $1,000,000 and each $250,000 from $1,000,000 to $5,000,000, taking into account particularly the factors of mileage, population, character of construction, providing for all operating expenses, taxes, fixed charges, depreciation and suitable return on investment, based on a twenty-year franchise, and also on an unlimited franchise," begs to submit a detailed memorandum by each of the three members of its sub-committee, showing, first, the hypothetical treatment of the problem presented; second, the actual figures of existing street railways, and third, a general treatise of the fare subject in the four metropolitan cities, New York, Chicago, Philadelphia and Boston, which, although somewhat outside of the scope of the question, deals with important features of the fare situation.

We would recommend that these memoranda be printed and circulated among the members of the association, so that full discussion may be had at the midwinter meeting, at which time a plan will be submitted by the committee looking to carrying forward this work by all members of the association.

We note with interest the decision of the United States government to establish a zone system in connection with the parcels post, which begins operation on Jan. 1 next. In a business such as that of electric railways, where approximately 33 1-3 per cent to 40 per cent of the traffic is handled within three to five hours out of the twenty-four, this representing practically the lowest load factor of any public utility, and where the cost of living and consequent wages paid are increasing by leaps and bounds, it is essential that the present 5-cent fare be limited in distance, and for the street railways of $5,000,000 annual gross earnings and less, as outlined in your instructions, it is apparent that the length of ride should not be over four miles.

*Abstract of a report read before the American Electric Railway Association. Chicago. Oct. 7-11, 1912.

REPORT OF COMMITTEE ON JOINT USE OF POLES*

BY W. J. HARVIE

The appointment of the committee grew out of the request of the New York Electric Railway Association for a thorough consideration of the subject of joint use by the American Electric Railway Association, together with other associations and interests involved in the joint use of poles, the ultimate object being to present some form of agreement and specification which would be mutually satisfactory to all who might be concerned in such construction or operation.

This subject was a very live one in New York State during the last year, and was taken up actively by the state association, on account of a number of instances in which the question of joint use had been raised. The result of their study of the question was the presentation of a form of agreement, including drawings and some specifications providing for suitable construction. A number of points of difference developed, however, between these and other specifications previously suggested by other associations and companies, and the subject became so important that the New York Association felt that it should be handled by the American Electric Railway Association.

In laying the matter before the American Association executive committee, it was recommended that it ask for a joint conference with representatives from the National Electric Light Association, the American Institute of Electrical Engineers and such other national associations or interests as might, in the opinion of the executive committee, be desirable.

After receiving favorable action at the hands of the executive committee, requests were sent to the interested parties by the president asking that one or more representatives be delegated to serve on a joint committee for a study of the entire question. As the telephone companies are vitally interested in the proposition, the American Telephone & Telegraph Company was invited to send representatives to confer with the committee. Considerable stress was laid on the fact that in the make-up of the joint committee it was desirable that the major portion of them should be familiar with the policies of the respective interests and should be able to discuss the question in the broadest possible light.

The power distribution committee of the American Electric Railway Engineering Association, which at that time was working on specifications for construction of this kind, was asked to have its association represented on the committee. The final make-up of the committee, therefore, consisted of five members of the American Electric Railway Association, one of whom represented the Engineering Association, two representatives of the National Electric Light Association and two representing the American Institute of Electrical Engineers, with an executive officer of the American Telephone & Telegraph Company and two of its engineers representing that company, sitting with the committee and conferring with it.

The formation of a committee having the representation given above thus insured the best thought of those who have been working on the specifications and agreements promulgated by the National Electric Light Association, the American Electric Railway Engineering Association and the telephone interests. It was thought that the American Institute of Electrical Engineers should be represented on account of the fact that it is not allied with any particular industry.

The subject resolved itself at once into two distinct parts—a specification section and an agreement section. At the first meeting of your committee it was suggested that the development of both the agreement and specification sections should be carried on simultaneously, thus gaining considerable time in the preparation of the report. It soon became evident, however, that the inter-relationship was such that the best results would be obtained by first reconciling all of the essential points in the specification section, the resultant of these being the basis for the agreement, and the committee proceeded along these lines.

The committee is happy to state that through the hearty cooperation given by the various members of the committee most of the debatable points have been agreed upon and the few remaining ones are fast approaching definite settlement. Owing to the various interests involved, however, and the viewpoints worked out in previously produced specifications, a final report could not be made at this time.

One of the important questions remaining to be settled has led to the construction, through the efforts of a committee member representing the National Electric Light Association, of a section of line showing one form of the actual construction proposed. This construction was viewed by the committee at its last meeting. Several changes were suggested and an alternative form of construction will be installed before a final conclusion can be reached.

Inasmuch as the subject under consideration involves other associations and interests, and therefore will be far-reaching in its effect, it is necessary for the committee to proceed with great care, if the report is to be worthy of the association and the others who are acting with it.

The committee therefore presents this progress report and asks that the committee be continued in order that it may complete the work. The committee further will appreciate any suggestions or instructions which the association may deem desirable to make at this time.

[The special committee on joint use of poles included the following members: W. J. Harvie, chairman, railway manager, J. G. White & Company, New York; Albert S. Richey, professor of electrical engineering, Worcester Polytechnic Institute, Worcester, Mass.; C. L. Henry, president Indianapolis & Cincinnati Traction Company, Indianapolis, Ind.; W. S. Twining, with Ford, Bacon & Davis, New York, N. Y.; N. T. Wilcox, Stone & Webster Management Association, Boston, Mass., all of the American Electric Railway Association; Farley Osgood, general superintendent Public Service Electric Company, Newark, N. J., representing the American Institute of Electrical Engineers and National Electric Light Association; Percy H. Thomas, consulting engineer, New York, representing the American Institute of Electrical Engineers, also F. B. H. Paine, Fidelity Building, Buffalo, N. Y., representing the same institute; W. F. Oviatt, general superintendent Narragansett Lighting Company, Providence, R. I., representing the National Electric Light Association, and F. H. Bethell, vice-president New York Telephone Company, New York, representing the American Telephone & Telegraph Company, New York.]

*Abstract of report read before the American Electric Railway Association, Chicago, Oct. 7-11, 1912.

The State Railroad Commission rendered a decision on Oct. 1 establishing through and joint rates between the Central California Traction Company, San Francisco, Cal., and the Atchison, Topeka & Santa Fe Railroad. The commission found that public convenience requires that the rates be established by the Western Pacific Railroad and the Atchison, Topeka & Santa Fe Railroad. The Central California Traction Company operates between Sacramento and Stockton, 70 miles distant, and its lines connect at Stockton with the Atchison, Topeka & Santa Fe Railroad. As to the public convenience of the proposed rates, the commission in its decision says: "As far as the public is concerned, any added convenience to it over that which it at any time has will constitute public convenience and necessity, provided this added convenience does not add any burden to the utility which is required to render the additional service, in this instance, to the railways in question—the Atchison, Topeka & Santa Fe Railroad and the Central California Traction Company, Stockton."

ELECTRIC RAILWAY SECURITIES*

BY MORRELL W. GAINES, STATISTICIAN BROWN BROTHERS & COMPANY, NEW YORK

Street railway securities are plainly the product of a new industry, and much less plainly then they should be the output of an industry whose impressive permanence and freedom from fluctuation of earnings afford the highest guarantees of value. They have not yet as a class assumed that position as investments to which their underlying stability of earning power fully entitles them. For this the fault is partly that they are new. Electric railway securities are as a too general rule sold to a clientele to which they are especially introduced at considerable cost, and they do not in most instances enjoy a free, open and voluntary public market. The blame for this, so far as blame lies, is with the industry and not with the investing public. It is only now passing over into the era of inviting credit by giving publicity. Its accounts, the terms of its franchises, its corporate structure and its financial history have been too closely guarded. Add to this the fact that the financial organization itself has not been entirely perfected, and the occasional disastrous surprises that have sprung from over-construction, secrecy of maintenance and misplaced reliance on faulty franchises, and you have the chief reasons why electric railway securities go to the discriminating rather than to the generality, and at a concession in price as compared with steam railroad issues of equal rank.

In intrinsic worth electric railway securities compare most favorably with those of the steam railroads. The earning power has the greater stability. The bonded debt is not relatively disproportionate to that earning power. The requirements for new capital outlay from time to time after a complete property is in full operation—requirements which not infrequently alter the entire financial outlook of steam railroads—are not so formidable.

A rough comparison between steam railroad securities and electric railway securities, with reference to the earning power which sustains them, may be made as follows. The figures are for 1910, the last year for which compilations have been published:

Capital stock outstanding:	
Electric railways	$2,380,011,921
Steam railroads, net in hands of public	5,526,991,778
Funded debt outstanding:	
Electric railways	2,302,094,296
Steam railroads (net)	8,811,584,162
Gross earnings:	
Electric railways	478,873,671
Steam railroads	2,829,109,462
Net earnings:	
Electric railways	195,234,698
Steam railroads	902,351,086

The steam railroad figures are complete and accurate, taken from sworn reports to the government. The electric railway statistics, on the other hand, while carefully compiled by a private agency, must be apologized for as being incomplete and to some extent misleading. The earnings cover 85 per cent only of the mileage represented by the stocks and bonds, 15 per cent not reporting. There may be some duplications included in the capitalization, representing intercorporate ownership. The practice of the companies in deducting taxes from net has not been uniform. True figures for the electric railways would show larger gross and net earnings and perhaps smaller capitalization.

The disparity in relative gross earnings is not an argument against the electric lines. Their operating ratio is much the lower and they save more out of the gross as corporate income. Net earnings alone give value to securities. Electric railways have 22 per cent as much net as steam railroads, while their funded debt is 26 per cent as much.

With reference to stock capitalization the comparison seems unfavorable to the electric railways. They appear to have 43 per cent of the outstanding stock of the steam lines, to carry which their 22 per cent proportion of net earnings is relatively small.

Steam roads are more mature than electric railways. They have grown up to their stock capitalization in many instances where there was originally nothing but water. Electric railway stocks are younger and less dried out, but as a class they have a very substantial equity in net earnings. There are among them a great number of issues paying steady dividends. But the proportion of electric railway stock paying dividends has not yet approached the 67 per cent of the total, or the average dividend rate of 7½ per cent attained by the steam railroads.

The great claim of electric railway securities to consideration, whether stocks or bonds, lies in the steadiness of the earning power and the sureness of its increase year by year. A compilation of gross and net earnings of all companies reporting their figures has been made by a financial periodical for the last eight years.

In this table 1911 shows a growth over 1904 that may be calculated as 55 per cent in gross and 57 per cent in net. Each year gives an advance. The panic reduced the rate of increase, but did not convert it into a loss. The average growth for the entire period is approximately 6½ per cent per annum for both gross and net. Nor was this increase procured at the price of a corresponding increase in property or in fixed investment. Figures for capitalization for 1911 are not at hand, but, as shown by a separate compilation, there was an increase of 40 per cent in stock and 61 per cent in bonds for the eight years 1903 to 1910. Earnings have increased faster than capitalization, the gross 8 per cent faster and the net nearly 12 per cent faster. Electric railways and electric railway securities have improved their position.

For the period under review the steam roads fell far behind the record of the electric railways. They will never have the serenity of advance that is inherent in the earnings of their younger brothers.

The underlying bonds of the old electric railway companies are, where franchises are of long term, in high repute as investments, almost without exception. Many are eligible for savings banks under the rigorous requirements of the laws of Massachusetts and for trust funds elsewhere. Their defect is that they are usually small issues with a narrow market. Rental stocks are of various quality. This was made evident in the reorganization of the Metropolitan system in New York City.

Of the general mortgage bonds there are three types. The first is essentially a second or third mortgage, without provision for the retirement of underlying liens. The second is the refunding mortgage under which the prior bonds will be gradually got out of the way. The third is the blanket first mortgage, secured by direct first lien on the entire property. Of these three forms the last named, less frequent among large properties than the other two, is much the best. A second mortgage may be wiped out, but a first lien has always the opportunity of clinging to its equities and working out its salvation. If in the course of time electric railways, freed from the exigencies of consolidation and the stress of initial development, can as a class offer large unified mortgages, properly safeguarded as to franchises, they will have a much more readily salable bond. As matters are, well-secured general mortgage bonds are better regarded as fixed investments than as marketable securities. Their price is low.

Improvement has been and is being made in the direction of financial publicity. A number of companies publish detailed annual reports. Too few have invited public confidence by advertising freely the full story of these four simple fundamentals. For that reason among others, electric railway stocks, as well as bonds, have a narrower, more individual, market, and at lower prices, than steam railroad issues of corresponding size, rank and promise.

The technical management of electric railways has been vastly improved within the last ten years. Investors are com-

*Abstract of paper read before the American Electric Railway Association, Chicago, Ill., Oct. 7-11, 1912.

ing to have confidence in the care and the skill of the executives of the systems whose size presupposes the employment of trained and experienced men. This confidence, in conjunction with the gradual improvement of the electric railway position, is responsible for the great success of the pioneer holding companies, a success which has brought into the field numerous imitators whose quality is yet to be proved.

The principle upon which holding companies have been formed is an eminently rational one. Few small properties have the necessary technical skill at command to make the most of their opportunities, and, if they did have it, their credit is limited. Holding companies, by pooling the oversight and the credit of a number of properties, can apply both money and skill to development. These companies invest on a margin. They hold the junior securities and the voting power, leaving the self-sustaining underlying securities in the hands of the public.

Like other instruments of transportation, street railways have a high ratio of fixed investment to annual earnings. The turnover of capital is long. Its ultimate return is of the distant future. The franchise is the most important single factor in valuing a street railway investment.

Securities protected by perpetual franchise with definite rate of fare and without onerous provisions are the most satisfactory to the investor. Next come term franchises reaching well beyond the maturity of his bonds or beyond the time when he will take profits on his stock. Franchises of recapture at a valuation will stand higher in his favor when their working has been proved. Already he is disposed to trust them in a reasonable degree. Short-term franchises he is learning more and more to avoid. Experience teaches him to shun the chances he formerly took of their renewal. He has now witnessed embarrassment and disaster from that cause. He has also had occasion to observe that in the last few years of a franchise it proves difficult or impossible for companies to obtain funds, that their service runs down and their earnings fall off long before the final day of reckoning.

Many street railway properties, and some among them of the largest type, have perpetual franchises. Many have term franchises of sufficient length to be protective, especially if sinking funds are provided. In other cases conditions are, in spite of effort to remedy them, indifferent or intolerable. The recent spirit of captiousness toward corporations has prevented extensions and renewals that were hoped for. Nevertheless, franchise disturbances must in the end come to a settled conclusion. Instances have arisen, as in New Jersey, where a state has voluntarily given up a short franchise law because it found railway development was killed by it. The custom of appraising physical, and even intangible, property at a more or less fair valuation at the end of a franchise is growing upon the cities, after the example set by Chicago. The ultimate truth of the matter is that street railways must grow—and under private management—if cities are to grow, and the franchises must tend in the final solution to fit the railways rather than that the railways should be confined to fit the franchises. In the meantime, the sovereign remedy against the distrust of investors is again publicity, explicit and direct, regarding the measure of franchise protection.

Next in importance to franchises as a factor bearing on electric railway securities is the sufficiency of the allowances for maintenance and depreciation. While the properties were new and without requirement of heavy repairs, maintenance was naturally on a lower scale than the present practice. While they were in the swift flux of evolution capital outlay for improvement or for renewal was synonymous and was, quite justly, met by drafts on the future earning power it went to create. Even now, however, in the more settled state of the art, there is here and there still a surviving tendency to fall back on prospective growth and to capitalize the larger expenditures for renewals instead of facing them in the expense account. There is no recognized standard of upkeep.

The association is deserving of praise for reducing electric railway accounts to orderly form and working its way toward the establishment of standards of maintenance expenditures.

All bonds, and most stocks, have sought lower levels in the past five years. The tide has been world-wide. As it has ebbed so it will flow, and the opinion is more and more widely held that the turning point is near. Electric railway securities, which have already shown signs of gaining in the favor of investors, will in that event be swept along with the main current. Operating problems of electric railways have been most admirably handled. As corporate and financial problems are more maturely met the securities, given under ripe management, reasonable capitalization and long franchises, should forge ahead under their own power to a better and more natural investment level.

THE ANNUAL BALL

The annual grand ball of the American, affiliated and allied association was held in the Gold Room of the Congress Hotel last evening and presented a splendid spectacle as Benson's orchestra began "The Winning Fight Two Step," which was the first dance. The floor was in perfect condition and the music was all that could be desired. The buffet luncheon was all the more enjoyed on account of its delightful informality and many partners were seen in the middle of a dance carefully carrying a half-eaten sandwich through the various maneuvers. The committee had thoughtfully printed this bit of information on the blue and white dance programs: "Buffet refreshments will be served about eleven o'clock, which will not interfere with the dancing program," and as previously stated, it did not interfere a bit. The galleries, as well as the floor, were well filled with the guests of the convention, including many invited for this occasion. Evidently many of the ladies had saved their most attractive toilettes for the ball, as, sartorially, it was beyond any question the Big Night of the week.

This was the dance program:

1. Two Step....."The Winning Fight"
2. Waltz ....."Eternelle Ivresse"
3. Two Step....."Ramshackle Rag"
4. Waltz ....."Vision of Salome"
5. Two Step....."Eight o'Clock Rush"
6. Waltz ....."Tres Jolie"
7. Two Step....."Empire City Rag"
8. Waltz ....."Septembre"
9. Two Step ....."Up the Street"
10. Waltz ....."Sphinx"
11. Two Step ....."King of Clubs"
12. Waltz ....."The Kiss Waltz"
13. Two Step....."The Fighting Hope"
14. Waltz ....."Des Blondes"
15. Two Step....."Everybody"
16. Waltz ....."Roses and Violets"
17. Two Step....."Robert E. Lee"
18. Waltz ....."Autumn Song"
19. Two Step....."Foolishness Rag"
20. Waltz ....."Count of Luxemberg"

We don't know when the dancing stopped, but it was after the Daily had gone to press.

NO ENTERTAINMENTS TO-DAY

No entertainment is provided by the committee for this, the last day of the convention, because it was thought the guests of the convention might appreciate a day to themselves to see the sights of Chicago or to enjoy a rest after the strenuous days and nights of the past week. Praise is heard on all sides for Chairman Farmer and his associates on the entertainment committee for the well-planned and successfully carried out program they provided. All of it has been good.

REPORT OF THE COMMITTEE ON CONSTRUCTION OF SCHEDULES AND TIMETABLES*

BY W. B. W. GRIFFIN, CHAIRMAN; J. E. DUFFY, R. E. LEE, C. F. HEWITT, A. D. SCHINDLER, C. E. MORGAN AND T. F. GROVER

Your committee held its first meeting during the mid-year conference week and at that time developed an inquiry form which embodied practically all of the suggestions of the executive committee. An inquiry sheet was prepared and sent to member companies, and from this many valuable data have been received and are on file in the secretary's office.

RULES FOR MISSES

Attention is directed to the great lack of uniformity in requirements for reporting for work, as well as to the discipline which is applied for failure to report as directed. The variations are not due to the size of road or geographical location, or even to class of service, that is, as between city and interurban operation. The most general requirement is to set the reporting time ten minutes before the time scheduled for the car to depart, though this is frequently reduced to five minutes, and in many cases no definite time is fixed at all. The above applies to regular men, but generally the same specification holds for extra men, though, of course, there are additional rules with regard to the latter as to periods when they shall report throughout the day.

An appendix shows the methods of discipline employed for misses or failures to report. In this connection your committee desires to call attention to what it considers a sharp distinction between an ordinary miss and what might rightly be termed a failure to report for work. A miss, it would appear, is a term that would be applied to an act of an employee through which he actually does report for work, but does not do so at the proper time but within a short period after the time definitely fixed as his reporting time. The other case, or what, in the opinion of the committee, should be termed a failure to report, should be considered as referring to an absolute failure to appear at the carhouse or report by telephone within a fixed period of time after his scheduled reporting time. Your committee feels that there is considerable difference between the two acts described and is of the opinion that different methods of discipline should be applied to govern each. Your committee recommends with regard to this subject as follows:

Reporting for work: Recommended, that all regular trainmen and extra trainmen having actual assignments be required to report for work ten minutes in advance of the time set for the beginning of their respective runs; extra men without regular assignment to report at the times called for on working board.

Recommended, that where trainmen are required to begin their runs from points other than carhouse, such trainmen, in the event they are unable to reach such starting point, shall be required so to report, by telephone or otherwise, to the dispatcher or other proper officer a sufficient length of time in advance as will permit another man to be sent to the point of relief in advance of the respective scheduled reporting time, failure so to report to constitute a "failure to report," as defined above.

DISCIPLINE FOR MISSES OR FAILURE TO REPORT

In considering the matter of discipline applied to the case of misses or failure to report, the committee submits appendices which have been developed to accord with what seem to be definite methods, as follows: (1) Discipline by reprimand and dismissal, no suspension; (2) discipline by reprimand, suspension and dismissal; (3) discipline by retirement to the extra list, no suspension; (4) discipline by suspension and dismissal; (5) discipline by merit and demerit system; (6) miscellaneous methods.

These have been further divided as between city, city and interurban and interurban service only.

DEFINING MISSES AND FAILURES TO REPORT

The committee recommends that:

A "miss" be defined as a failure to report on time, as required by schedule or rule, the trainman actually appearing for work within a short definitely stated period of time thereafter.

A "failure to report" be defined as an actual failure to report at the scheduled reporting time or by telephone or otherwise within a stated period subsequent to such scheduled reporting time.

CARHOUSE RECORDS

Inquiry was made as to the practice of companies in maintaining records of lost trips, turn-backs short of destination, and as to whether cars actually reach scheduled terminal points, also as to who is responsible for such records.

This question is probably not of pressing importance to the interurban roads, for the reason that most of such properties use some dispatching system and maintain a regular train sheet which supplies data to guard against such failures as are noted above and provides the companies with all necessary information. On city lines, however, the question is more important and the replies indicate that by far the greater portion of city companies are depending upon their trainmen for the fulfilment of schedules. In other words, the committee has not been able to obtain any records of a systematic checking up of turn-backs, etc., the usual plan being to rely upon the trainmen making such records, though, of course, street inspectors, dispatchers, etc., are frequently in position to and do make note of such matters.

The committee feels that the lack of a proper method has led, in many cases, to differences between the general public and the operating companies and is of the opinion that frequently short trips are run without the knowledge of the company. On the few city lines which use dispatching systems in which the trainmen report before leaving terminal points, of course the difficulty is overcome, and in the case of single-end operation little trouble is encountered. There may also be other systems which would serve the purpose, perhaps certain automatic registrations of train movements which would give the company a proper record, but in view of the slight progress the committee has been able to make in the study during the present year, it strongly recommends that the matter be continued, and that the 1913 committee give it further attention.

METHODS OF KEEPING TIME OF TRAINMEN

Among the queries was that of the practice of companies as to time paid for and this developed the fact that there is much difference in plan, many of the companies paying for platform time only, and others paying for different call and reporting times. The committee feels that this latter is a vital point to all companies and believes that the association should endeavor to adopt a standard method of paying trainmen for all classes of work, believing that such a standard method would do away with many of the disputes which now arise between employees and operating companies. The committee, therefore, recommends that this subject be continued for another year and have the thorough study that its importance justifies.

MEAL RELIEFS

Your committee finds that generally the city lines either provide a meal relief or arrange their schedules in such a way as to allow men certain off-time in which meals may be had. It has developed a small table showing the practice of the various companies and has subdivided by kind of service, and in this table has assumed that where the schedules are so made as to afford the off-time referred to, this constitutes a meal relief. On interurban systems it is difficult and often prohibitive to provide meal reliefs and, therefore, your committee does not

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, Chicago, Oct. 7-11, 1912.

feel that a recommendation in favor of the practice on these systems is justified.

SENIORITY AND WORKING LISTS

Your committee calls attention to the variation in the practice of posting such lists, and while not at this time ready to make a definite recommendation as to standard forms of lists or boards, the committee does heartily indorse the plan of displaying these records for the inspection of the trainmen at all times.

In the case of working lists for extra men, where the statement is made that the lists are posted permanently, we have assumed that where the lists for the extra men are put out at various times during the day this constitutes a permanent posting.

PRACTICES OF COMPANIES IN KEEPING TIME OF TRAINMEN

Methods	Number Companies Reporting
Time slips prepared by trainmen	*43
Time cards and detention cards	1
Time card on car	3
Taken from trip sheets	*20
Taken from trip sheets and overtime cards	2
Taken from trip sheets and report to foreman for delay time	3
Taken from trip sheets and book register	1
Kept by dispatcher, clerk, starter, etc., to whom trainmen report	27
On and off sheets signed by trainmen	20
Trainmen pay themselves	1
Ohmer register record	1
Trainmen report to check clerk; starter also keeps record which is checked against trainmen's report	1
Peg board, supervised by clerk	1
Paid per run	1
Book record prepared per regular schedule, timekeeper noting changes	1
Time clocks	5

*Checked against schedule and in many cases approved by starter, dispatcher, etc.

SENIORITY LISTS

Method	When Posted	Number Companies Reporting
Peg boards	Permanently	8
Peg boards and card system	Permanently	1
Peg boards and loose-leaf	Permanently	1
Board with metal slides	Permanently	2
Blackboard	Permanently	5
Bulletin board	Permanently	2
Printed or typewritten lists	Permanently	29
Printed or typewritten lists	Not posted	22
Loose-leaf	Permanently	3
Loose-leaf	Monthly	1
Loose-leaf	Not posted	6
Card index, written lists	Permanently	3
Card index, written lists	Not posted	1
Card index	Not posted	6
Card index in envelopes, lists	Posted when changes occur	1
Employment record	Permanently	1
Employment record	Not posted	1
Book form	Not posted	17
Book form and lists	Permanently	9
Book form and card system	Not posted	1
Dispatchers' or trainmasters' records	Not posted	2
Dispatchers' or trainmasters' records	Posted monthly	1
None kept		3
Kept for extra men only		1
Memorandum form	Not posted	1
Slips given trainmen, stubs in office, new lists every six months	Not posted	1

CONCLUDING SESSION OF THE ACCOUNTANTS' ASSOCIATION

After the joint session with the Engineering Association, which is reported elsewhere in this issue, the Accountants' Association held its concluding session at the Saddle & Sirloin Club yesterday. The vice-president, L. T. Hixson, Terre Haute, Indianapolis & Eastern Traction Company, called the meeting to order at noon and occupied the chair in the absence of President P. S. Young, who was obliged to leave the city.

The report of the committee on a standard classification of accounts was presented by the chairman, H. L. Wilson, Boston Elevated Railway. An abstract of this report is published elsewhere in this issue.

Chairman Hixson asked W. F. Ham, Washington Railway & Electric Company, regarding the last annual meeting of the National Association of Railway Commissioners, to which the Accountants' Association has always appointed delegates. Mr. Ham said that the convention of that association in 1911 occurred at the same date as the Accountants' Association meeting, and for that reason no representative was present. It was decided by the association that this committee should be continued in order that the Accountants' Association might be represented at the next convention of the National Association of Railway Commissioners.

J. C. Collins, New York State Railways, then presented the report of the committee on resolutions. The first resolution expressed the pleasure of the association at the recovery of President McCarter of the American Association from the attack of typhoid fever which prevented his attendance here, and its regret that he was unable to be present to review the achievements of his administration. Resolutions were also passed in regard to the resignation of H. E. Weeks, Tri-City Railway & Light Company, as secretary and treasurer of the association, and of Elmer M. White as second vice-president of the association. Resolutions were passed thanking the Saddle & Sirloin Club, the South Side Elevated Railroad and others to whom acknowledgments of courtesies were due.

The chair then announced the appointment of a committee to co-operate on behalf of the Accountants' Association with the Census Bureau in the compilation of the 1912 census of electric railways. The appointment of this committee was requested by William M. Steuart, chief statistician for manufactures, in his address before the association on Wednesday. The committee is as follows: A. L. Linn, Jr., New York State Railways; W. H. Forse, Jr., Union Traction Company of Indiana; M. R. Boylan, Public Service Railway of Newark, N. J.

F. J. Pryor, Jr., American Railways, chairman of the committee appointed in response to the suggestion of President Young that the association undertake a program of education, reported that the committee believed that there was a good field for labor of this character. Such a work could be made an educational movement for the benefit of the industry. The report of the committee was received and the committee was continued for another year.

The report of the nominating committee was then read by the chairman, F. E. Smith, Chicago Railways. It recommended the election of the following: President, J. H. Neal, general auditor Boston Elevated Railway; first vice-president, M. W. Glover, secretary and auditor Mobile Light & Railroad Company; second vice-president, G. W. Kalweit, auditor Milwaukee Electric Railway & Light Company; third vice-president, F. B. Lasher, accountant New York State Railways; secretary and treasurer, M. R. Boylan, general auditor Public Service Railway, Newark, N. J.; executive committee: F. E. Wilkin, general auditor Des Moines City Railway; George G. Whitney, chief clerk Washington Railway & Electric Company; Thomas P. Kilfoyle, auditor Cleveland Railway; Robert J. Clark, comptroller Kansas City Railway & Light Company.

The secretary was instructed to cast a ballot for the nominees and they were declared duly elected.

Mr. Glover, the first vice-president, was called to the chair in the absence of Mr. Neal, the newly elected president. He and the other newly elected officers who were present thanked the association for the honor. The meeting was then adjourned.

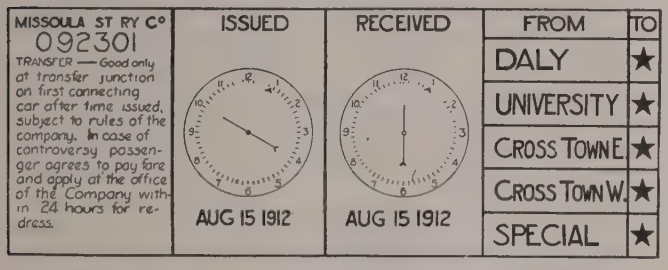
An English manufacturer has just completed four gas engines, each rated at 2,130 hp, for a power station at Kamatha, Japan. These engines are to be operated on producer gas using the low-grade soft coal available in that country. They are to be run at 94 r.p.m. and will be coupled to alternators of 1,500 kw each with the pole pieces mounted directly on the rim of the flywheel. The producers will be of the Mond type arranged for the recovery of ammonium sulphate as a by-product, and it is estimated that 44 per cent of the operating cost will be covered by the sale of this material. The interest and depreciation charges of the installation, as is common with all such plants, are very high and bring the total estimated cost of power up to 0.46 cent per kw-hr., including the credit for sale of the by-product.

ONE-MAN PREPAYMENT CAR OPERATION*

BY S. R. INCH, GENERAL MANAGER MISSOULA (MONT.) STREET RAILWAY

While the operation of one-man cars is not new, it is only within the past three years that a type of car has been developed which has made such operation free from difficulty and danger, and has not only secured economy in platform expense but has also provided adequately for the safety of the public, the collection of fares, and the maintenance of reasonably fast schedules.

Until very recently, the operation of one-man cars was limited to the smallest systems or to very unimportant feeder lines


MISSOULA ST RY C°
092301
TRANSFER — Good only at transfer junction on first connecting car after time issued, subject to rules of the company. In case of controversy passenger agrees to pay fare and apply at the office of the Company within 24 hours for redress.
ISSUED
AUG 15 1912
RECEIVED
AUG 15 1912
FROM
TO
DALY ★
UNIVERSITY ★
CROSS TOWN E. ★
CROSS TOWN W. ★
SPECIAL ★

One-Man Prepayment Car—Form of Transfer Ticket Used

of the larger systems, where, if need be, cars could be stopped while fares were being collected, or where the company was willing to take long chances by having the motorman run the car at a slow rate of speed and then leave his controller and collect fares while the car was in motion.

The defects of the system when so operated were so many and so obvious that the use of the one-man cars fell into merited disrepute.

Recent experience, however, seems to prove that in most cities of 50,000 people or less one-man prepayment cars can be operated under the same schedules and handle the same traffic as two-man cars of the prepayment type with the positive advantages of greater freedom from accident and reduced operating expenses.

In order to secure such a result, however, it is necessary to go to the other extreme from the dilapidated equipment, the poor track and the ragged overhead work which often characterized the one-man systems of the past, for the successful one-man system of to-day will need to be equipped with first-class rolling stock and the track and overhead work of the one-man system will have to be maintained at all times in good condition.

There are now several places where one-man prepayment cars of the general type recommended are in use, but so far as I know the first system to be designed specially for one-man operation along these lines, and to be operated continuously and exclusively as such, is the one with which I am connected, one of a number of public utility properties in Montana owned by William A. Clark.

The lines of the Missoula Street Railway were built in 1909, and the one-man car which we use was designed in April of that year. The problem which we set ourselves to solve in its design was the reduction of operating expense without any corresponding sacrifice in matters of safety and schedule. The question of operating expense was, as everyone who is familiar with the inter-mountain states will believe readily, a very serious matter indeed with us, for wages in Montana are from 50 per cent to 100 per cent higher than in either the Eastern or the Pacific Coast States, while income is based on the universal 5-cent fare and therefore is no greater than elsewhere. It was very evident that unless operating expenses could be cut materially below the ordinary figures, we could not expect to pay our way, and this meant that we must reduce to a minimum the number of men employed. This we did in two ways: first, by the elimination of the entirely unnecessary conductor, adding his duties to those of the motorman; and second, by adopting reasonably fast schedules and reducing lay-overs to a minimum in order to give good service with relatively few cars.

DOUBLE-TRUCK CARS

In order to maintain safely the fast schedules necessary for reasonably good service in a scattered district operated with comparatively few cars, and to do so with comfort to our passengers, we adopted double-truck cars exclusively, and equipped them all with air brakes.

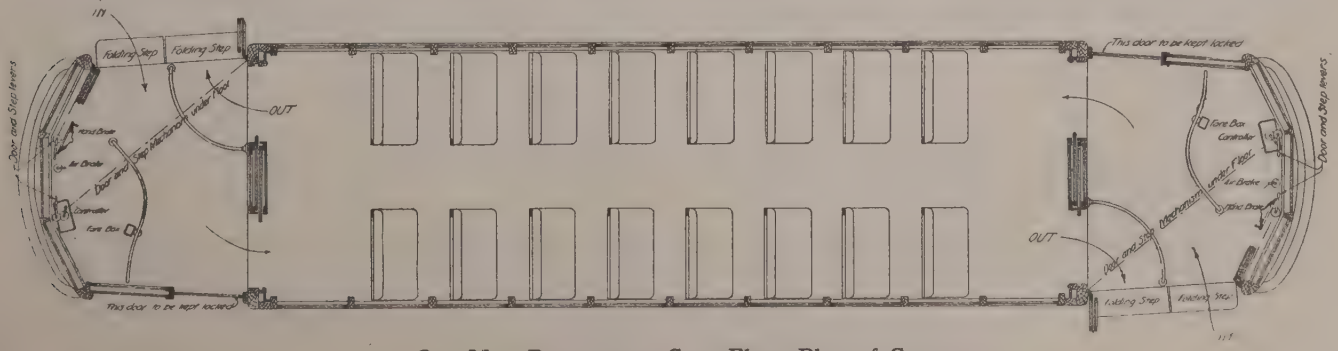
City cars are double-end, thirty-two passenger Brill semi-convertible cars, 39 ft. 9 in. in over-all length, mounted on maximum traction trucks, and equipped with two G. E.-210 interpole 600-volt motors.

On our interurban line, we use a single-end, fifty-two-passenger car, 46 ft. in over-all length, mounted on M. C. B. trucks and equipped with four motors of the above-mentioned type. Steel wheels are used throughout, driving wheels being 33 in. in diameter. The gear ratio on all cars is 15/71.

ARRANGEMENT OF PLATFORM

The platforms are 6 ft. long and are arranged so that passengers board and alight at the same platform and at the same side of the car. The double folding vestibuled doors, together with corresponding folding steps, are operated by hand levers under the control of the motorman, and on some of the cars the bulkhead doors are controlled in a similar way. On the platform is a Brill 4A fare box. Railings are used to divide the platforms into three sections for boarding and alighting passengers and the motorman, respectively. There are no grab handles visible when the car doors are shut, and the steps fold up so as to afford no foothold; the bumpers are provided with inclined metal shields to prevent persons from riding on them and the vestibule windows are guarded to prevent people from climbing in at the rear end of the car to avoid paying their fare. The rear platform is used as a smoking compartment, the doors being locked securely.

The floor plan of our standard car, published herewith, will give a good idea of the special platform arrangement.



One-Man Prepayment Car—Floor Plan of Car

*Abstract of paper read before the American Electric Railway Transportation & Traffic Association, Chicago, Ill., Oct. 7-11, 1912.

SYSTEM OF OPERATION

The car is brought to a complete stop before the doors are opened, and the doors are closed before the car is started.

The cars stop at the near side of intersecting streets, which places the front platform opposite the sidewalk, and are not stopped to take on or discharge passengers except at street intersections.

Push buttons placed in every side post enable passengers to signal the motorman.

Fares are collected by means of a fare box, and the motorman is required to make change and issue transfers, which must be asked for when the passenger pays his fare. We have adopted a method of run rotation, so that each man's receipts are checked by the receipts of other men on the same run. The plan has worked satisfactorily, not only by permitting comparisons, but by preventing undue familiarity between motormen and regular passengers.

SCHEDULES

With the cars so operated and with a working day of eighteen hours, city cars make an average of 4300 miles per month, while on the semi-interurban lines a car makes an average of 8800 miles per month. The schedule speed on the city lines, including lay-overs, is practically 8 m. p. h., and on one of the interurban runs is 16.4 m. p. h.

The regular headway on the city lines is fifteen minutes, but our lines are so arranged that nearly all cars pass through the center of town, where we have laid double track. This arrangement gives us a five-minute schedule for three-quarters of a mile through the down-town section.

ACCIDENTS

It will no doubt be acknowledged that for all systems attempting fast schedules the use of cars having closed doors and folding steps is desirable. For the one-man system, the use of cars of this type may be considered essential, and, as with two-man systems, the number of platform accidents will be thereby greatly reduced.

It is, I think, fair to claim for one-man cars so equipped, and with passengers boarding and alighting at the front platform under the immediate observation of the motorman, a distinct and positive advantage for the one-man car as compared with the ordinary two-man car, for it removes the division of responsibility as to the starting of the car which has been such a frequent cause of platform accidents.

In the past two and a half years our cars have made nearly a million car-miles, practically without accident and absolutely without a single accident which could in any way be charged to one-man operation.

HANDLING TRAFFIC

However, the faster speeds at which closed platform cars may be operated safely makes the net delay very small even in large cities, and since the delay to one-man cars from this cause is no greater than in the case of two-man cars, it becomes altogether negligible in any place where the use of one-man cars would be feasible.

On many occasions, we have had 120 passengers on our 32-passengers cars, with the car in charge of one man as usual. With most small systems, however, the handling of large standing loads is unfortunately rare and the one-man car is not recommended for places where such profitable conditions are the rule rather than the exception.

Making change and issuing transfers sometimes cause slight delay, but much less than might be thought and certainly not enough to be a serious disadvantage. While the use of tickets would be of some advantage to us as saving the delay incident to making change, we have not found delay of this kind sufficient to cause us to offer tickets for less than 5 cents straight.

The issue of transfers might be more serious, however, where the number issued is large and where the usual transfer is used. Delay from this cause can be avoided largely by the use of transfers specially prepared for the purpose. We have devised a transfer which suits our conditions very well. This is illustrated herewith.

OTHER CRITICISMS

It has also been suggested that with the one-man system it would be impossible to deal with rowdyism on the cars and to prevent people from stealing rides. It is our experience that the latter trouble can be prevented altogether by the proper construction of the car and, although one of our lines runs to a military post, another to a large lumber camp, and still another to a state university, we find that all these lines are served satisfactorily with one-man cars and that trouble of the kind mentioned is exceedingly rare.

Another criticism refers to the possibility of the sudden illness or death of the motorman. Exactly the same criticism applies to the operation of most interurban lines, where the motorman is so separated from the rest of the crew that they would probably not know of any such mishap to him for some time, and in a lesser degree to the operation of ordinary city cars, where it is quite possible that the conductor would not immediately know of the motorman's condition. The fact is that the possibility of such an accident is so very remote that it does not have much consideration in any surface system. However, if it was thought desirable, it would be quite feasible to develop a "dead-man's handle" for the Type K controller used commonly on city lines, and, in addition, to use automatic stopping devices in connection with signals on interurban lines.

At first, we did have a good deal of trolley trouble, but it has been avoided almost entirely by putting a trolley pole at each end of the car, located immediately above the king bolt of the truck, by the use of trolley catchers, and most important of all, by the use of Detroit type trolley frogs located very carefully and securely. We also find that the use of 6-in. high-speed, deep-groove trolley wheels throughout is of some advantage. It is now a rare occurrence for us to have a trolley leave the wire.

ATTITUDE OF THE PUBLIC

We anticipated much more trouble from this source than we actually experienced and what little we actually had was of very short duration, and has now died out altogether. The public has found that no accidents have resulted from the one-man plan, and apparently realizes too that the system has enabled us to give better and more frequent car service than we would be able to do otherwise. We have appealed to the enlightened self-interest of the public and have found by a frank discussion that the benefits of more lines and more cars which the reduction of operating expense due to the one-man plan has made possible are now well understood in our community and that following this understanding has come public indorsement.

I feel that the satisfaction of the people of Missoula may be taken as the ultimate attitude which the people of any town would take where the system was properly applicable and properly introduced.

ATTITUDE OF EMPLOYEES

In order to gain the men's support, we appealed, as in the case of the public, to their self-interest; first, by paying a bonus of 5 cents per hour for one-man operation, and second, by so equipping the cars as to reduce the labor of running them to a minimum. The result has exceeded our expectations and now the men themselves are as enthusiastic about that one-man idea as the officers of the company could wish.

It is no doubt a fact that less prejudice on the part of the public and less antagonism on the part of the employees to departures from the ordinary method of operation are to be expected in the starting of a new street railway system, such as ours, than in making changes of a similar character on an existing system.

It is, however, easy to over-estimate this advantage, for the

population of any town where a street railway would be built is composed largely of people who are familiar with ordinary methods of street car operation, and who, consequently, will view any innovations of a radical nature with a good deal of suspicion.

I think that companies now operating two-man cars that might try the operation of one-man prepayment cars would find the fact that several such systems are now in successful operation would be of greater advantage to them in attempting to introduce one-man cars than the fact that our system was installed where there had not previously been any car service was to us.

RESULTS

In Missoula and its surroundings, with a total population of about 17,000, the Missoula Street Railway, using one-man prepayment cars over an equivalent of 19 miles of single track during the past two and a half years under reasonably fast schedules, has operated profitably eight regular double-truck cars, carried, including interurban business, over 2,500,000 passengers, and run nearly a million car miles without a serious accident.

Notwithstanding that carmen's wages in Montana are probably higher than anywhere else in the United States, being from 35 cents to 40 cents per hour in Missoula, according to length of service, operating expenses have been kept below 14 cents per car-mile, and it is believed can be reduced still further.

This makes an interesting comparison with the figures given in the United States census of street and electric railways in 1907, where the average operating expense for all systems having a gross income of less than $500,000 a year was shown to be 16.8 cents per car-mile. The census figures are based upon the average rate paid throughout the whole country to motormen and conductors, which is less than 70 per cent of the average rate paid in Montana. These comparisons appear to show that if in Montana one-man cars can be operated for 14 cents per car-mile, very much lower unit costs should be obtainable in places where carmen's wages are nearer the average rates.

Our annual saving, due to one-man operation, is now about $15,000 a year, and this will increase as the system grows, as it must do in a town which has trebled its population between the census of 1900 and that of 1910.

It is my belief that similar results can be obtained by any company operating in a town or city of, say, 50,000 population or less, under ordinary conditions, and that in such a case it is probable all the lines could be well served with one-man cars. It also seems probable that many of the larger systems could adopt the plan safely for suburban lines which do not go through the downtown districts.

The fact that in St. Paul and Minneapolis cars having platforms closed while in motion have been used successfully for many years may be taken to dispose of the criticism that this feature of our plan is not feasible in the comparatively small cities for which one-man cars are recommended. Reference may also be made to the instant approval which the traveling public accorded to the near-side car adopted recently in Philadelphia; this car, while used in Philadelphia as a two-man car, having the conductor stationed on the front platform with the motorman, would seem to make an excellent one-man prepayment car for places where the traffic is light. This car, in all its main operating features, seems to be very similar to the Missoula car, although the platform arrangement and general construction of the Philadelphia near-side car are quite different from the Missoula car.

Considered together with the excellent results obtained by other systems using one-man cars, the success of the Missoula car would seem to go far in support of my contention that in most towns and cities of comparatively small size the use of cars operated as described will make the employment of conductors an unnecessary expense offering no compensating advantages.

REPORT OF THE JOINT COMMITTEE ON ENGINEERING ACCOUNTING*

BY F. B. LASHER, CO-CHAIRMAN; J. Z. MURPHY, CO-CHAIRMAN; J. M. JOEL, J. C. COLLINS, C. E. THOMPSON, H. M. GRAFTON, J. H. HANNA, H. H. ADAMS, JOHN SIBBALD AND M. J. FRENCH.

During the past year your committee has held two meetings. The following sub-committees were appointed:

Committee on inter-department charges—J. H. Hanna, Washington, D. C.; C. E. Thompson, Chicago, Ill., and A. F. Elkins, Columbus, Ohio.

Committee on the subdivision of maintenance of equipment accounts—John Sibbald, F. B. Lasher and J. C. Collins.

Committee on collection and compilation of rules for depreciation—F. B. Lasher, J. C. Collins and M. J. French.

The subject of scientific management was discussed thoroughly, and was assigned to the entire committee.

SUBDIVISION OF THE MAINTENANCE OF EQUIPMENT ACCOUNTS

In the report presented at the 1911 meeting the committee recommended a number of sub-accounts which the companies could adopt to supplement their use of the standard classification prepared by the Accountants' Association. The sub-accounts related to the operating maintenance expense accounts and did not affect in any way the primary accounts of the standard classification. They were designed to provide the fuller details regarding charges to maintenance accounts that are necessary on many railroads.

This year the committee, in its consideration of the general subject of maintenance accounts, calls attention to the advantage of an exact division between the maintenance of rolling stock and maintenance of power plant accounts. Under the present standard classification of operating expenses, expenditures chargeable to the general account "equipment" cover both rolling stock and power plant and no natural complete division as between these two important classes of expense is afforded; that is to say, the maintenance of equipment charges as prepared affords no separation of the expenses as between power plant and rolling stock. The committee feels that it is desirable that such analysis should be provided by the classification, and therefore recommends that the general account "equipment" be divided into two classes of primary accounts, one dealing with power plant maintenance and the other with rolling stock maintenance. With this subdivision there would be two groups under the general account "equipment," as follows:

II. EQUIPMENT:—

Group I—Power Plant Equipment.
Superintendence of power plant equipment.
Power plant equipment.
Substation equipment.

Group II—Rolling Stock Equipment.
Superintendence of rolling stock equipment.
Passenger and combination cars.
Freight, express and mail cars.
Locomotives.
Service cars.
Electrical equipment of cars.
Electrical equipment of locomotives.
Shop machinery and tools.
Shop expenses.
Horses and vehicles.
Other miscellaneous equipment expenses.
Depreciation of equipment.
Other operations—dr.
Other operations—cr.

It will be noted that the foregoing suggestion would divide the present primary account "superintendence of equipment" into two primary accounts, one covering the superintendence of power plant equipment and the other covering the superintendence of rolling stock equipment.

In order to be consistent the classification, if it is to divide the superintendence of equipment as between power plant and rolling stock, should also divide the superintendence of

*Abstract of report read before the American Electric Railway Accountants' and Engineering Associations, Chicago, Ill., Oct. 7-11, 1912.

transportation as between power and operation of cars under the general account "conducting transportation." The committee, therefore, suggests for consideration in connection with the changes proposed in the general account "equipment" the following classification for "conducting transportation:"

IV. CONDUCTING TRANSPORTATION:—

Group I—Power

Superintendence of power.
Power plant employees.
Substation employees
Fuel for power.
Water for power.
Miscellaneous power plant supplies and expenses.
Lubricants for power.
Substation supplies and expenses.
Power purchased.
Power exchanged—balance.
Other operations—dr.
Other operations—cr.

Group II—Operation of Cars

Superintendence of transportation.
Passenger conductors, motormen and trainmen.
Freight and express conductors, motormen and trainmen.
Miscellaneous car service employees.
Miscellaneous car service expenses.
Station employees.
Station expenses.
Carhouse employees.
Carhouse expenses.
Operation of signal and interlocking systems.
Operation of telephone and telegraph systems.
Express and freight collection and delivery.
Loss and damage.
Other transportation expenses.

It is recommended by the committee that this part of the report be referred to the committee on a standard classification of accounts and form of report of the Accountants' Association for consideration.

RULES FOR DEPRECIATION

This sub-committee was asked to gather such data as might be available as to the practice of certain companies in the treatment of depreciation, and it has been able to collect considerable information, which is in the hands of the secretary of the association for the use of member companies.

SCIENTIFIC MANAGEMENT

In continuing the work of the previous year your committee has given further attention to the subject of scientific management on electric railways. It assumes that what is meant by scientific management, or, as it is sometimes termed, efficiency engineering, is economical management or standardization of efficient methods. Each company pursues its own policies in this respect, and many of the practices which are being introduced by the so-called efficiency engineers have been followed in principle on electric railways for a number of years.

The committee believes, however, that there is room for progress through careful analysis of these methods and their gradual standardization to meet the needs of all properties, small as well as large. For that reason it sent a letter to a selected list of company members. This letter asked for information and data regarding results that have been secured by the use of efficient methods, and that the answers be segregated as between the maintenance of way, power plant, overhead lines and cables, and maintenance of equipment departments.

A number of replies were received, and in the majority of cases it was found that there was no standard from which comparisons could be made. The committee, therefore, reached the conclusion that while work of great value is being done by individual companies, the association has a wide field for labor before it in the collection of information regarding methods that have yielded good results on individual systems and may be adapted and standardized for general use.

Among the companies that are making a systematic study of their affairs so as to attain greater economy of operation and maintenance is the Boston Elevated Railway. This company has an efficiency club and an efficiency committee, composed of some of its general officials and responsible heads of departments and these organizations meet periodically. In addition to the work conducted through these agencies similar studies are made by individual departments. In order to illustrate the methods which are followed in the rolling stock department your committee presents as an appendix of this report the reply which it received from the Boston Elevated Railway, giving many details of interest.

Other possibilities for improvement exist. The committee has considered some of the efforts made to effect economy in the use of power. Various methods can be used to encourage the motormen to be economical in the use of power. There are several devices on the market for recording the performance of individual motormen. These afford a method of comparison. In the investigation of this subject the committee learned that savings have been accomplished by careful instruction of motormen in regard to the consumption of power by cars. By systematic obedience to the instructions, economies reaching as high as 10 per cent on the total consumption of power have been reported.

To illustrate one method that has been employed to effect greater economy in the use of power in the operation of cars, even without the use of mechanical means, the committee submits circulars which have been issued to the employees of the Public Service Railway of Newark, N. J., as follows:

"Save the power. Useless waste of power is burning up thousands of good American dollars every year.

"Coasting cars cut current cost. Every foot a car coasts without power is so much current saved. Save the power.

"The motorman who notches his controller properly is on time oftener than the one who hits the button and blows the breaker. Save the power.

"Fast feeding of controllers wastes the current and damages the equipment. Save the power."

The committee realizes that this is only one of a number of suggestions for economy that can be adopted in various departments of electric railways and improved from time to time without the necessity of investment in apparatus.

It is the earnest recommendation of this committee that member companies, in connection with the study of economical management and efficient methods, give further study to the subject of the economical use of power.

COST ACCOUNTING

Economical management should be accompanied by detailed cost accounting. The committee believes that costs of shop work and other departmental expenses should be kept in full detail in order that the management may know the exact expenditure for different classes of work. The advantage of this is that it enables the company to make a study of the various operations so as to establish standards of time for the different jobs. If the costs of existing work are determined and reduced to a unit basis, it is a simple calculation to fix the time required for specific jobs. With that knowledge the next step to take is to decide on a reasonable standard time and enforce it.

While the committee did not find it practicable, with the other work that it had planned for the year, to make a thorough investigation of the practices of member companies in this respect, it believes that a year should not pass without some progress in this direction. It, therefore, submits, as an example of the character of accounting that is necessary to lead to the results mentioned, forms which may be used in connection with the overhauling of rolling stock. While these forms show the principal details which the committee recommends should be presented, they are intended to be suggestive only and can be subdivided further if that should be thought desirable. It will be noted that, in addition to the detail costs mentioned, space is provided for the inclusion of charges for supervision. These charges may be apportioned according to a somewhat arbitrary time basis and are purely for the local supervision conducted under the direction of the head of the sub-department directly concerned. They have no connection with any general overhead charges.

The work of the committee has broadened so widely that

its attention has been called to other subjects of profitable research. Among these is the job order system of accounting for both capital and maintenance expenditures, which has been in successful use by many companies for several years. We recommend that this subject be taken up as a special study, either by a special committee or by the committee on engineering accounting for next year.

BIBLIOGRAPHY OF SCIENTIFIC MANAGEMENT

In the report presented to the 1911 convention there was compiled and published by the committee on engineering accounting, through the efforts of its chairman, P. S. Young, a bibliography of the subject of efficiency and scientific management. At the request of the present committee Mr. Young has brought this bibliography up to date and it is presented as an appendix of this report.

INTER-DEPARTMENT CHARGES

The committee regrets that it has no definite report to make in regard to inter-department charges. The members of the committee appreciate the importance of this subject, and recommend that it be assigned to a special sub-committee for investigation next year. This sub-committee should give consideration also to the question of overhead charges.

APPENDIX

EFFICIENCY METHODS OF THE BOSTON ELEVATED RAILWAY

The letter in regard to efficiency methods of the Boston Elevated Railway is addressed by John Lindall, superintendent of rolling stock and shops, to Paul Winsor, chief engineer motive power and rolling stock of the company, and says in part:

"This department continuously during recent years has endeavored to take action that would promote efficiency and we have constantly bettered conditions and reduced costs. We have at no time made hasty or radical changes. Many of our buildings and their equipments are not only not well adapted for our present requirements, but also they are of such construction that we are confronted with serious problems to do our work economically. All our study and action has been directed toward making the best possible use of existing equipment. Without expenditure of money for remodeling buildings or installing equipment, we have endeavored so to plan our work and use our existing shop layout as to secure the largest output of work with the least outlay of new money. We have installed labor-saving equipment where practical, such as air or electric hoists.

"Our policy has been to plan and schedule our work to the fullest extent possible, to lay out our shops and adjust our labor force to meet this planned schedule, to surround workmen with labor-saving utilities, to specialize workmen on various classes of work and, most important of all, to create conditions attractive to workmen and thus promote their good work and loyalty.

"We endeavor constantly to promote co-operation between men and to enthuse all heads and leaders to study for constant improvement and devise saving methods.

"We have not followed any set methods or any one theory or system. We have studied every shop and its conditions as a local factor and endeavored to apply business reasons and 'horse sense' to meet particular requirements and conditions.

"We have had one man assigned during recent months to study and specialize shop conditions and methods. This man devotes his whole time to this work and reports upon conditions and makes recommendations for changes in any direction that would promote efficiency and reduce costs. As such recommendations are duly approved this man makes regularly reports of progress.

"Toward increasing output and also toward benefiting workmen, we have installed piece prices to a considerable extent, with a result that there is shown a saving in cost to company as well as materially increased earnings to capable workmen.

PIECE PRICES

"We now have the major portion of our work done in the armature shop, in the foundry and in the body paint shop on a piece work basis and in addition a considerable amount of the various kinds of work in machine shop and other shops.

"We endeavor always to fix a price on a unit operation. We do not time work strictly on a stop-watch basis, but rather fix a running time on a considerable number of pieces made and allow for a workman's natural movement and necessary time away from the job for personal reasons. But we do endeavor, before fixing a price, to surround the workman with every utility for quick, convenient and economical handling of materials and tools and with every proper tool, jig or other equipment.

"A piece work price once made is not subject to change unless the method of doing the operation is changed.

SHOP CONDITIONS AND UTILITIES

"We strive constantly for neat and orderly shops. We keep materials located in order and in sight, and all floor space under machines and benches is kept clear. We supply trucks, carriages, stands and tote boxes for handling materials and locating such convenient to workmen. We have a general labor force to move materials and do not allow mechanics to move materials. We plan to have located at machines and benches only materials of work in process and we keep other materials in a shop storage section until ready to put such in operation.

"We have a workmen's shop committee on shop improvement, order and cleanliness and on safety devices. This committee investigates accidents and studies conditions to prevent repetition of such. It also makes reports on shop conditions and recommendations for improvements.

PLANNED MOVEMENT

"We endeavor to lay out our work in the machine shop based on our machine tool capacity and to supply men to run the machines. We look to foremen in our shops that are not running on a specific schedule to plan work every day for next day in advance.

"We endeavor to put through large quantities at one set-up of machine and keep a lead on stores so as to reduce to a minimum the necessity for rush jobs, which are costly, due to upsetting machine tools and disarranging planned movement. In the armature shop, truck shop, car-body shop and wherever else possible, we lay out work in sequence of operations. In the truck shop, to illustrate, we have a work crew to knock down the truck and five other crews to carry on its assembly to completion, every crew doing a certain definite class of work, and the trucks are moved forward in order on the tracks from one crew to another.

"In our truck shop and in our car-body shop we schedule the regular work for every season in advance. About four months before beginning the work for the season we receive reports from inspectors on trucks and car bodies that need repairs in shop during the coming season. From this list we make a schedule for these shops and at once issue requisitions for needed materials, to get such materials into stores and through shops in full season for needs of repair shops.

"The schedule as made for the truck shop and car-body shop provides for a definite number for every week during the season, based on estimated time required to put through the shop. To specialize workmen we endeavor to bring in all of one type of truck during one period. We also plan the schedule so that the withdrawals from carhouses will be such as to cause least expense in handling and least interruption to service.

"In carrying out this schedule in detail, our service car department through the yardmaster plans ahead for the transportation in and out from carhouses in full season to meet this schedule.

"We plan the movement of wheels in the same general manner, commencing with new wheels from the manufacturer and through the distribution of wheels to and from carhouses for service until shipped as scrap.

"We plan our general movement of stock service cars in an orderly and economical system, schedule regular stock service from stores to our twenty-five carhouses and eleven power stations, of coal from wharves to power stations and carhouses, and of sand and ashes. For special transportation work of service cars, we plan each day's service one day in advance, to be interrupted only by emergency or rush work.

"We plan regular methods of handling and moving scrap materials and wheels from shops, etc., until delivery to consignee.

"We have a schedule for car cleaning at all our carhouses. This schedule was worked out carefully after extended study of the work. It covers every detail of cleaning on all types of cars, names methods of work, tools to use, number of men to do work, intervals at which work should be done, time for the job, etc. A copy of this schedule is published herewith.

"We operate a general information office, located in our stores department, through which all inquiries are submitted by telephone as to location or delivery of material to various points, and through this office, with advance advice, we endeavor to plan, not only regular work, but special work in so far as possible and practical, as well as service car transportation.

"We believe that we are working in the right direction and have made a reasonably good start toward securing efficiency.

"We know that there is very much yet to be done and more can be accomplished only by constant and intelligent study of methods and attendant conditions, applying the best remedy toward improvement that seems available, and by a constant follow-up supervision to make sure that changes decided upon are carried into effect and that a saving has been made.

"We believe the results have justified our time and efforts and we are convinced that we will continue to show steady improvement increasingly as a result of what we have already accomplished.

BOSTON ELEVATED RAILWAY RULES GOVERNING CAR CLEANING—SURFACE-CAR CARHOUSES

"These rules to be followed except in particularly cold or unusual weather conditions, when rules may be suspended by direction of day carhouse foreman.

Note.—Time given in time required column is a maximum time on 25-ft. box cars. Time allowed on 26½-ft. and 20-ft. cars to be proportional to surface covered.

26½-Ft., 25-Ft. and 20-Ft. Box Cars

Daily Cleaning—Exterior of Car

No.		Time Required.
1	Mop painted work and side glass (except during stormy weather)	One man 10 minutes.
2	Clean vestibule glass with damp chamois and towel	One man 10 minutes.
3	Mud splashes to be removed with wash brush and clean water	One man 10 minutes.

Daily Cleaning—Interior of Car

4	Sanding. Sand boxes to be tested by dropping sand on the rail, then fill sand boxes.	One man 4 minutes.
	Sweeping car body, vestibule and steps by the following method: Sprinkle lightly steps, platforms and interior floor with disinfectant in solution with water. Turn up cushions. Sweep floor thoroughly toward and onto vestibule	One man 12 minutes.
	Dirt from vestibule and steps to be swept into receptacles. Special attention to be given to dirt around controllers and brake ratchets and behind cab doors. Proper scraper to be used for removing heavy dirt.	
6	Dusting. Note: At least two hours' time to elapse between sweeping car and dusting same.	
	Cars to be dusted as follows: All of the interior of car body and vestibules and fixtures of same, including window and monitor glass, to be dusted with feather duster, except the following, viz.: lamps, hand strap poles, hand straps, window sills, dasher sills, register glass, which are to be wiped with dry towel. Care should be taken to see that lamps are not left loose in socket	One man 6 minutes.

Defects in Cars

"Car cleaners are required to report to foreman on duty immediately (giving car number in all cases) the following defects, viz.: Sand boxes failing to work properly, defective light circuits, missing spare lamps, broken glass, missing sign sticks, missing cardboard signs, defective curtains, broken register or bell cords, exceptional disorder conditions in cars requiring special attention or any other defects that may come to their attention.

Periodical Cleaning—Exterior of Car

No.		Frequency of Period.	Time Required.
7	Washing. Wash cars all over below roof using clean water in troughs or pails and wash brushes	After each rain storm.	Two men 15 min. each.
	In connection with this job the front windows (inside) of vestibule to be washed with brush and water. Vestibule dasher sills to be wiped dry.		
8	Painted woodwork, dashers and exterior signs to be washed with water and oil soap. Saponified water to be applied to colored work with suitable brushes, to white work with suitable scrub brush. All soap to be removed from car body afterward by thorough rinsing with clean water. Windows to be thoroughly cleaned after this process	Two months.	Two men 2 hours each.
9	Monitor and ventilator glass to be cleaned by wiping with dry towel	Two weeks.	One man 12 minutes.
10	Headlights to be cleaned with oil soap, water and waste	Once a month.	One man 10 minutes.
11	Headlights to be painted after thorough cleaning	Twice a year.	One man 10 minutes.

Periodical Cleaning—Interior of Car

		Frequency of Period.	Time Required.
12	Glass side window glass, bulkhead glass and vestibule glass to be cleaned with damp chamois	Once a week.	One man 30 minutes.
13	Curtains to be thoroughly cleaned with whisk brooms and then wiped with towels	Two weeks.	One man 15 minutes.
14	Platforms and steps loosening all caked dirt with suitable scraper and removing same with whisk broom	Two weeks.	One man 10 minutes.
15	Dashers to be washed and scrubbed, using corn broom and oil soap and water	Once a month.	One man 15 minutes.
16	Dashers to be painted with quick drying paint furnished by Bartlett Street shops, care to be taken that paint is thoroughly dry before car goes out. (Paint will probably require eight hours to dry)	Twice a year.	One man 10 minutes.
17	Woodwork in car bodies and vestibule, including monitor glass, to be cleaned by first wiping with dry towel and then washed with damp sponge. Specially clean water to be used on this job. Heel boards only may be washed with oil soap and water if conditions require it	Once a month.	One man 1 hour.

Semi-Convertible Cars Nos. 1, 2, 3, 4 and 4-A.

Daily Cleaning—Exterior of Car

No.		Maximum Time Required.
20	Mop painted work and side glass (except during wet weather)	One man 15 minutes.
21	Clean vestibule glass with damp chamois	One man 15 minutes.
22	Mud splashes to be removed with wash brush and clean water	One man 10 minutes.

Daily Cleaning—Interior of Car

23	Sanding. Sand boxes to be tested by dropping sand on rail, then fill sand boxes. Cars to be sanded before being swept	One man 4 minutes.
	Sweeping car body, vestibule and steps by the following method: Sprinkle lightly, steps, platforms and interior floor with disinfectant in solution with water. Using a suitable broom, sweep side sills and floor under transverse seats, sweeping all dirt onto center matting, sweep center matting and floor space not previously covered toward and onto vestibule floor	One man 20 minutes.
	Dirt from vestibules and steps to be swept into receptacles. Special attention to be given to removing dirt around air-brake pipes, hand-brake ratchets and behind cab doors. Proper scraper to be used for removing heavy dirt.	
25	Dusting. Note: At least two hours' time to elapse between sweeping car and dusting same.	

		Maximum Time Required.
	Cars to be dusted as follows: All of the interior of the car body, vestibule and fixtures of same, including window and monitor glass, to be dusted with feather duster, except the following: Lamps, hand-strap rails, window sills, dasher sill, seat arms and register glass, which are to be wiped down with dry towel. Care should be taken to see that lamps are not left loose in socket	One man 10 minutes.

DEFECTS IN CARS

"Car cleaners are required to report to foreman on duty immediately (giving car number in all cases) the following defects, viz.: Sand boxes failing to work properly, defective light circuits, missing spare lamps, broken glass, defective curtains, defective doors, broken register or bell cords, exceptional disorder conditions requiring special attention or any other defects that may come to their attention.

Periodical Cleaning—Exterior of Car—Semi-Convertible

No.		Frequency of Period.	Maximum Time Required.
26	Washing. Wash cars all over below roof using clean water in troughs or pails and wash brushes. In connection with this job the front windows (inside) of vestibule to be washed with brush and water. Vestibule sill to be wiped dry	After each rain storm.	Two men 20 minutes each.
27	Painted woodwork, dashers and exterior signs to be washed with water and oil soap. Saponified water to be applied to colored work with wash brushes, to white work with scrub brush. All soap to be removed from car body afterward by thorough rinsing with clean water. Windows to be thoroughly cleaned after this process, using pumice stone, if necessary, to remove the rust accumulation	Every two months.	Two men 2½ hours each.
28	Monitor glass to be cleaned by first wiping with dry towel, then cleaning with damp chamois. Includes interior and monitor glass No. 1, 2, 3 cars	Every two weeks.	One man 15 minutes.
29	Headlights to be cleaned with oil soap, water and waste	Once a month.	One man 10 minutes.

Periodical Cleaning—Interior of Car—Semi-Convertible

No.		Frequency of Period.	Maximum Time Required.
30	Glass. Side glass, air door glass and vestibule glass to be cleaned with damp chamois	Once a week.	One man 40 minutes.
31	Curtains. To be thoroughly cleaned with whisk broom and then wiped with dry towel	Two weeks.	One man 20 minutes.
32	Platform and steps. Removing all caked dirt by first loosening dirt with suitable scraper and removing same with whisk broom	Two weeks.	One man 10 minutes.
33	Dasher washing. To be washed and scrubbed, using corn broom, oil soap and water	Once a month.	One man 30 minutes.
34	Dasher painting. To be painted with quick drying paint furnished by Bartlett Street shops. Care to be taken that paint is thoroughly dry before car goes out. (Paint will probably require 8 hours to dry)	Twice a year.	One man 10 minutes.
35	Woodwork and side sills in car body and vestibules, also monitor glass, to be cleaned by first wiping with dry towel and then washed with damp sponge, specially clean water to be used on this job	Once a month.	One man 2 hours.

DUTIES OF NIGHT FOREMAN CAR CLEANERS

"Responsibility of Night Foreman.—Night foremen are responsible to day foreman of their respective carhouses for a proper performance of their duties.

"The night foreman has charge of the carhouse and its contents and is chief of night organized fire-fighting force. During the absence of night foreman from carhouse between 6 p. m. and 7 a. m. a competent employee designated by the day carhouse foreman will be responsible for night foreman's duties.

"Duties of Night Foreman.—To supervise the following work and to work with the men to such an extent as the day foreman may designate, taking into consideration proper time required for supervision, viz.:

"Car cleaning as laid out by day foreman, to be performed according to rules; lining up cars for routes; signing cars for morning work; to provide men to work on sand cars; cleaning lobbies and offices; to see that trolleys are kept off the wire, except when men are working on cars; to see that heater and motor switches on cars are open; poster work; to provide men for wrecking calls when necessary; to see that boilermen perform their duties; to provide men on request to call snow crews; to furnish day foreman with a daily record of all work done, also record of unusual events and defects in cars."

REPORT OF COMMITTEE ON A STANDARD CLASSIFICATION OF ACCOUNTS*

BY H. L. WILSON, CHAIRMAN; W. F. HAM, W. H. FORSE, JR., AND H. E. SMITH

While the members of this committee are the same as during several years past, Mr. Ham, who has assumed new and additional duties on account of his appointment as vice-president of his company, felt that he could no longer retain the chairmanship, and on Jan. 22, 1912, the president appointed Mr. Wilson to succeed him. The other members of this committee wish to take this opportunity to thank Mr. Ham for his uniform courtesy and consideration during the many years of his chairmanship.

Since the publication of Bulletin No. 7 of the Interstate Commerce Commission, which was effective on Jan. 1, 1912, 144 questions have been asked through the bureau of statistics and accounts of the Interstate Commerce Commission or directly of the committee, and naturally the consideration of these questions by the representative of the commission and the members of your committee, who are quite widely separated, requires a very considerable amount of correspondence before final decision can be reached.

During the year the association has published a new edition of the standard classification of expenditures of operating revenues for road and equipment of electric railways, the classification of operating revenues of electric railways and the classification of operating expenses of electric railways, and, through the courtesy of the Interstate Commerce Commission and the Central Electric Railway Accountants' Association, there have also been included under the same cover the Interstate Commerce Commission decisions upon questions raised under classifications embodied in its Accounting Bulletin No. 7 and the Central Electric Railway Accountants' Association alphabetical list of expense. The committee wishes to take this opportunity to thank again the Interstate Commerce Commission and the Central Electric Association for permitting this to be done.

The committee also expects to be called upon shortly to take up with the Interstate Commerce Commission the question of a classification of expenditures for additions and betterments, a form for general balance sheet statement, a classification of revenues and expenses of auxiliary operations and a form of income and profit and loss statement, in order completely to cover all accounting questions.

It also seems likely that the committee may be called upon to revise the text of the classifications which are at present used.

The committee doubts its ability to accomplish this during the coming year, but is willing to co-operate in every way possible with the Interstate Commerce Commission to round out completely its system of accounts and forms of report. It is sure that the same harmonious relations which have always existed will continue, and that the result, as soon as the work can be properly done, will be satisfactory to all.

*Abstract of a report read before the American Electric Railway Accountants' Association, Chicago, Oct. 7-11, 1912.

REPORT OF THE COMMITTEE ON WAY MATTERS*

J. M. LARNED, CHAIRMAN; C. S. KIMBALL, VICE-CHAIRMAN; C. L. CRABBS, R. F. KELKER, H. F. MERKER, B. E. TILTON, C. H. CLARK, E. H. BERRY, C. W. GENNETT, JR.†

The following subjects were assigned to the committee for investigation this year:

From the executive committee:—

(1) Nine-inch girder-grooved and guard rail, and 7-in. girder-grooved and guard rail, embracing the principles outlined in the report of the committee on way matters for 1911.

(2) Consideration and further development of rail joint outlined in the report of the committee on way matters for 1911.

(3) Proper ballast for tracks in paved streets.

(4) The use of titanium, nickel and chromium, or any other cleansing material in the manufacture of rails. This subject to be handled by the sub-committee appointed from the way committee to act in conjunction with the American Society for Testing Materials in regard to the matter of steel in rails.

(5) The use of T-rails in streets.

(6) Proposed change in track gage for electric railways.

From the committee on standards:—

(7) A revision of the books of rules and regulations for the government of employees of the way department as proposed by the committee on way matters for 1911, and an investigation of methods and systems of operation, and of standard installations, with a view to incorporating in the uniform code such additional instructions and rules relating thereto as may seem desirable for their adoption as "standard."

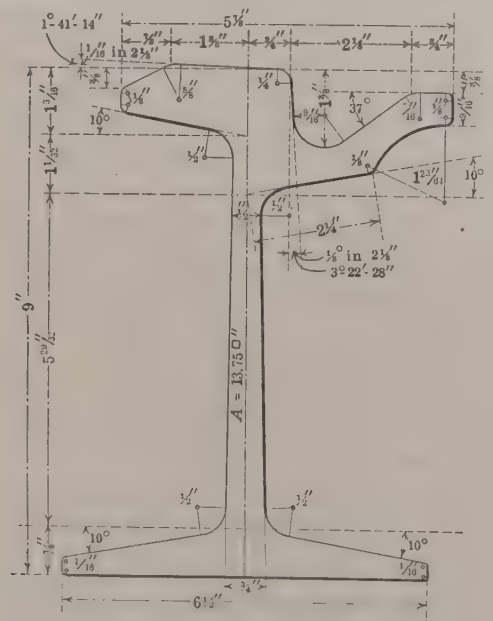


Fig. 1—Proposed 9-in. Standard Rail

From President Ackerman: —

(8) The consideration of a uniform method for designating compromise joints.

At a meeting held in New York Jan 26 the subjects were apportioned to sub-committees as follows:—

Nine-inch and 7-in. girder-grooved and guard rail, a joint for these rails and a uniform method for designating compromise joints: H. F. Merker, R. F. Kelker and C. S. Kimball.

Proper ballast for tracks in paved streets: C. H. Clark, C. L. Crabbs and E. H. Berry.

The use of titanium, nickel and chromium or any other cleansing materials in the manufacture of rails, splice bars for girder and high T-rails and specifications for open-hearth girder and high T-rails: J. M. Larned, B. E. Tilton and C. W. Gennett, Jr.

The use of T-rails in streets: F. G. Simmons, B. E. Tilton and C. H. Clark.

The revision of the rules and regulations for the government of employees of the way department: C. S. Kimball, J. M. Larned and C. L. Crabbs.

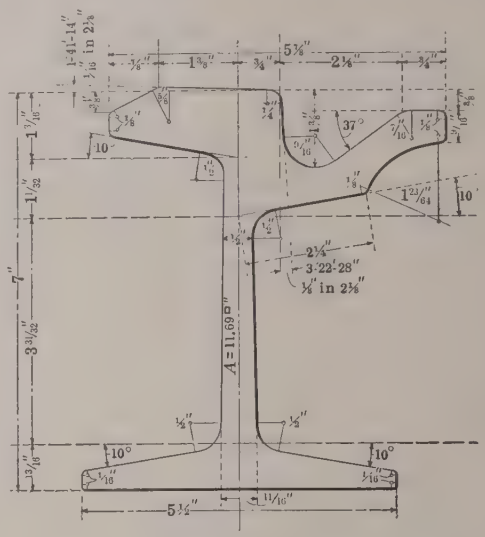


Fig. 2—Proposed 7-in. Standard Rail

The second session was held at Niagara Falls, May 20 and 21, 1912. At this meeting the committee learned with regret of the resignation of Chairman Simmons, who had severed his connection with the field of electric railway work. At the request of President Ackerman the duties of the chairman were undertaken by Mr. Larned, and Mr. Clark consented to act in Mr. Simmons' place as chairman of sub-committee No. 4.

NINE-INCH AND SEVEN-INCH GIRDER-GROOVED AND GUARD RAILS

The following brief reference is made to the work of previous committees upon this subject, as a matter of record.

The committee on way matters for 1907 recommended for use in cities where T-rail was not approved the 9-in. and 7-in. girder-grooved rails shown upon pages 122 and 123 of the Proceedings for that year.

The committee on way matters for 1909 confirmed the report of the 1907 committee and recommending these two sections for adoption as "recommended practice" upon streets "where the traffic is confined to the railway strip, or is so congested that the railway strip is continually used by vehicles."

The committee on way matters for 1910 approved the principles outlined in previous reports. The committee on standards for 1910 approved the recommendations of the 1909 committee on way matters and these recommendations were approved by the convention.

The committee on way matters for 1911 made a careful revision of the work of the previous committees and submitted a 9-in. girder-grooved section and an analysis of the principles involved in its design and recommended that further consideration of the 9-in. girder-grooved, a 9-in. girder-guard rail and a 7-in. girder-grooved and guard rail be undertaken by the 1912 committee. It will be seen, therefore, that none of the various girder rail sections submitted has received the final approval of your association.

The rail section submitted by the 1911 committee and the principles involved in its design seem to have met with very general approval, though it was not considered advisable to take action upon this section, without a corresponding guard rail and without providing at the same time for 7-in. girder-

*Abstract of report read before the American Electric Railway Engineering Association, Chicago, Oct. 7-11, 1912.

†F. G. Simmons, Chairman, resigned March, 1912.

grooved and guard rails. This section is, therefore, again submitted, as Fig. 1 of this report, with the approval of your present committee. Your committee also submits proposed sections for 7-in. girder-grooved rail and 9-in. and 7-in. girder-guard rail, Figs. 2, 3 and 4 respectively. In the design of these sections your committee has been guided by the following considerations, in addition to those outlined by the 1911 committee.

SEVEN-INCH GIRDER-GROOVED RAIL

As the duties required of the head, tram, tread and fishing surfaces are not affected by the depth, logically they should follow the same lines in 9-in. and 7-in. rail.

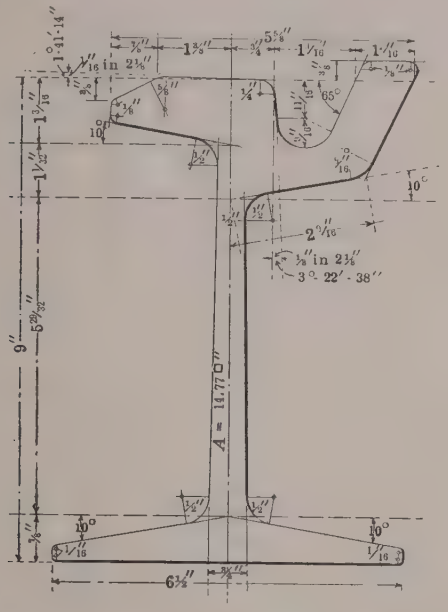


Fig. 3—Proposed 9-in. Standard Guard Rail

The width of base should be unaffected by the depth in respect to wear upon it and upon the structure immediately supporting it, but with regard to stability the width may be reduced. A proportionate reduction without going into any unnecessary fractions was therefore made, and the width of the base was taken at 5½ in. The thickness of the flange at the edge has been left the same as in the 9-in. rail. This and the angle of the finishing surface fixed by last year's report determined the thickness of the base at other points.

The web has been merely reduced from the bottom, giving it the same strength that it had in the 9-in. rail.

GIRDER-GUARD RAIL

We believe that all dimensions of these rails should agree with those of the girder-grooved with which they are intended to connect, with the exceptions of those dimensions which are affected by the groove and guard. Theoretically a different width groove is required for each radius, wheel base and wheel flange, but operating conditions do not permit of such refinement, nor is such refinement necessary, since during the major portion of its life the guard rail cannot, through wear, meet the theoretical requirements.

For better alignment along the gage line at connections, the slope and top fillet at the gage line of the head have been made to conform with those of the connecting section. The slope at the guard side of the groove conforms practically to that required for a wheel flange of the association standard with a 6-ft. wheel base upon a curve of 50-ft. radius. The width of the groove, 1 9/16. in., level with tread, is sufficient to pass the association standard wheel flange on a 40-ft. radius curve. The depth of the groove, 1¼ in., is, we believe, sufficient to provide for all vertical wear upon the head of the rail during its life, which is usually limited by curve wear upon the sides of the head and guard. The depth is limited by the fixed fishing dimensions of the straight line rail and by the thickness required for the guard at the neck.

The accepted practice of raising the guard ⅜ in. above the head of the rail has been adhered to, though we recognize that this forms some slight obstruction to vehicular traffic and is largely the cause of the more rapid wear and rutting of pavement in and around special work. The thickness of the guard is sufficient to permit considerable wear, without reducing the strength so far as to make it useless. The reduction in depth of groove provides sufficient metal at the neck of the guard to prevent it from bending or breaking at this point.

These rail sections have not been submitted to the manufacturers by this committee for their consideration, it believing that all the essential features were covered last year.

We recommend that these girder-groove and girder-guard rails as shown in Figs. 1, 2, 3 and 4 of this report be adopted as "standard."

DESIGN FOR JOINT PLATES

The committee on way matters for 1911 submitted for consideration a proposed form of bolted joint plate.

Your committee has confined its consideration of this subject to the plain channel-plate type of bolted joint as outlined by the 1911 committee, believing that there is at present a very large demand for a point of this type, and that this demand will continue for some years. The relative merits and demerits of this type of rail joint as compared with other specialized and, for the most part, patented joints have not been considered.

Failures due to poor design of plate may be attributed largely to insufficient fishing surface or insufficiency of metal in the web, either of which faults may cause a line contact or nearly so at the fishing surfaces, thereby materially decreasing the life of the joint; the former is defective in that the contact surface approximates a line, and the latter in that the plate will bend or buckle under the load applied by drawing up the bolts, thus giving a line contact between plate and rail. Your committee believes that the life of this style joint will be materially increased, at small additional cost to the completed track structure, when a plate is designed of such strength and stiffness that

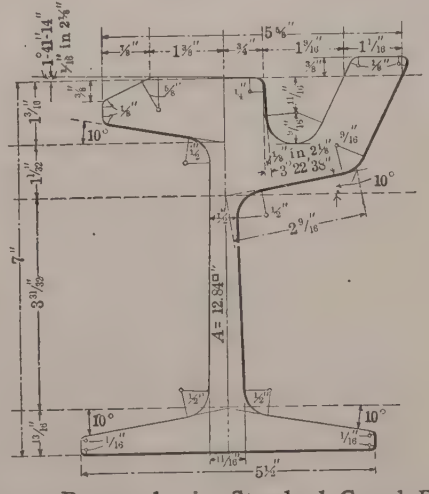


Fig. 4—Proposed 7-in. Standard Guard Rail

it cannot be bent under any load applied when tightening the bolts, particularly when supplied with channel contact surfaces of such width as the head of the rail will permit.

We have not considered it necessary to go into a detailed consideration of the proper length for these plates, believing that the customary lengths, 26 in. for a six-bolt joint on 7-in. rail, 32 to 36 in. for twelve bolt joint on 9-in. rail, are correct, and we prefer for the present at least, to leave undetermined and to the judgment of the individual purchaser the question of the size of the bolt and of the hole for the same in plate and rail.

Though not essential to the life of the joints, ample space should be provided when practicable, under the joint plates, for bonding purposes.

Believing that the joint plate for 9-in. rail submitted by the 1911 committee on way matters conforms to the requirements, we submit the same as Fig. 5, with our approval, and have also

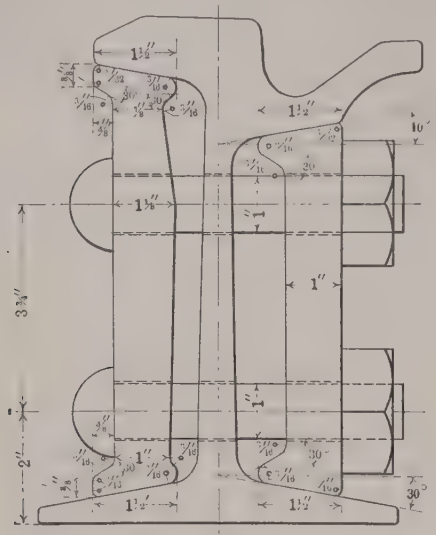


Fig. 5—Bolted 9-in. Joint for Recommended Practice

prepared a design for joint plates for 7-in. rail along the same general lines which we approve and submit as Fig. 6.

Your committee recommends these joint plates as shown in Figs. 5 and 6 for use, with bolted joints in connection with the rails shown, Figs. 1, 2, 3 and 4, as "recommended practice."

A UNIFORM METHOD FOR DESIGNATING COMPROMISE JOINTS

There has been considerable complaint of the confusion caused by the various conflicting methods used in naming compromise joints. All companies which manufacture these joints designate them either as "right hand" or "left hand" and what one company calls a "right hand" joint another company calls a "left hand" joint. Your committee can see no good reason for the retention of these terms and has agreed upon a logical method of naming these joints. This method, illustrated in Fig 7 of this report, recommends itself because of its brevity and simplicity.

PROPER BALLAST FOR TRACKS IN PAVED STREETS

Your committee is unable to make a report upon this subject, largely because the replies to data sheets sent out have not been received, and recommends that the subject be continued and referred to the 1913 committee.

ALLOYED STEEL RAILS

The treatment of steel for rails with various alloys has been a question of study and experiment for several years, the chief object sought being to prolong the life of rails by the addition of hardening and toughening qualities, preserving at the same time the ductility necessary to insure freedom from brittleness. Important limitations are at the very outset imposed; primarily, the cost of the finished rails and, secondly, the odd shaped or unbalanced sections of rails—which preclude the possibilities of heat treatment. These remarks are confined to the common methods used in attaining the desired result, which is a moderate-priced, long-lived rail of any section immediately available in any quantity. Therefore, it is only necessary to take up the subject of titanium, manganese and nickel-chrome rails, for while there are various other known alloyed steels, their use in rails with the limitations mentioned makes their consideration here unnecessary.

Ferro-Titanium Steel.—The addition of the alloy ferro-titanium to either Bessemer or open-hearth steel is to-day the most common method of seeking to prolong the life of steel rails without materially increasing their cost. The alloy is, as the name indicates, composed chiefly of iron and titanium, the latter being a chemical element found in various ores and conspicuous for having great affinity for oxygen. The manufacture of the alloy renders obtainable in it various proportions of titanium, so that a 15 per cent alloy means that nominally there is that amount of titanium present as against 85 per cent of iron, but these figures are not fixed and allowance must be made for the presence of other ingredients, as carbon, aluminum, etc. The theory on which the use of ferro-titanium is advocated is

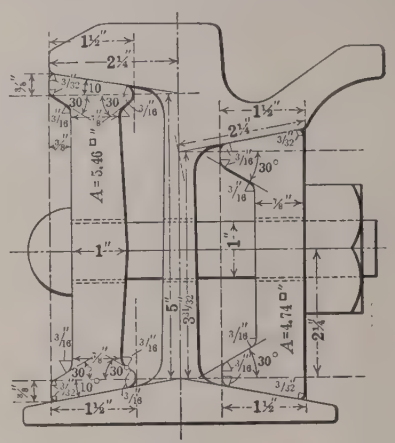


Fig. 6—Bolted 7-in. Joint for Recommended Practice

very simple, hinging upon the affinity that titanium has for oxygen, or largely upon the effect of chemical reactions that occur from its addition to the molten steel, resulting in a cleansing, so that the name "scavenger" has often been applied to the alloy. There ase two brands of ferro-titanium alloy available for use. The one known as the Rossi process is most frequently used, and differs principally from the other or Goldschmidt alloy, because of being practically free of aluminum. The latter brand containes from 4 to 6 per cent of aluminum, which is a deoxidizing element often used in casting steel to reduce piping and blowholes.

The amount of titanium alloy to be used is a matter of some argument, but enough should be added thoroughly to saturate the molten metal with titanium. Theoretically then a trace of titanium in the finished steel may be regarded as proof that enough has been added to the molten steel to effect a complete deoxidization. Recent practice advises the addition of 0.1 per cent metallic titanium to either Bessemer or open-hearth steel, and while this figure may be taken as a safe minimum, there is abundant reason to think that a larger amount would be more satisfactory, especially under some conditions. Success due to the use of titanium has resulted from a denser, more uniform and homogeneous metal, as might be expected from the nature of its duty as a scavenger. Granted that the metal is clarified by using titanium, the possibility of in-

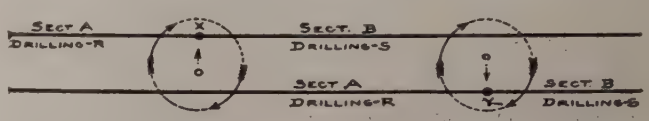


Fig. 7—Proposed Method of Designating Compromise Joints

Observer stands between rails at O, facing joint. All readings left to right, as in reading a book, and as indicated by arrows. Joint X would read: One combination joint connecting Section A worn ¼ in.; drilled R with Section B worn — Drilled S. Joint Y would read: One combination joint connecting Section B worn — Drilled S with Section A worn — Drilled R.

creasing the carbon content without a material loss of ductility occurs, so that of late many tons of rails have been made containing more carbon than formerly whose wearing qualities are regarded as greatly increased, and with no loss of shock resisting qualities. Recommendations as to the carbon content as well as to the other usual elements had best be left to the indi-

vidual case, at least until more definite information has been obtained.

We believe that when used under proper metallurgical conditions titanium alloy increases the wearing qualities of rails, sufficient evidence having been produced as a result of careful measurement to justify such conviction. Whether the increased wearing quality is economically profitable to the purchaser is a different question, depending upon the first cost of the rails, and experience with grooved girder and high T-rails for street and interurban uses has not been sufficient to make accurate figures obtainable.

Manganese Steel.—Manganese steel is invariably a high-carbon open-hearth steel containing from 12 to 15 per cent of manganese. Steel having such a proportion of manganese present when quenched in water from a red heat becomes exceedingly hard and tough but remains sufficiently ductile to resist impact. The manufacture of rails of such composition has attained considerable headway in the last few years, and it is now possible to produce any section if ordered in fair quantity. The process is quite simple, involving principally the addition of a large amount of ferro-manganese to the open-hearth metal. The treatment of the ingots in the soaking pits must be attended with great care, and finally after rolling and sawing to length, the rails must be immediately immersed in a tank of water. Naturally the long lengths become very crooked when thus cooling, so that a greater amount of cold straightening often becomes necessary. A very tough and ductile steel results, the most objectionable feature of which is the impossibility of sawing or drilling it, and therefore, careful ordering to length and punching of all holes is necessary. While the price of manganese steel rails quite precludes their common adoption for straight track, still for curves and in special or hard service track the benefits derived are such as to warrant their careful consideration.

Nickel-Chrome Steel.—Some large tonnages of nickel-chrome steel rails were rolled for steam roads several years ago, in which the nickel and chromium were additions to the steel of the open-hearth furnace and have given splendid wearing results, although it is true that the rate of breakages has been high. Since that time, however, there has come into common use a large supply of iron ore, known as Cuban ore, containing nickel and chromium, therefore rendering unnecessary any addition of these elements to the molten steel in the open-hearth furnace or converter. The use of this Cuban ore at some of the Eastern mills has made the alloy steel available at no increase of price, and its composition running close to 1½ per cent of nickel and one-half of 1 per cent of chromium seems to add very desirable qualities to rail steel, making it in many respects comparable to steel with a furnace addition of 3½ per cent of nickel.

Several thousand tons of this Mayari steel, as it is called, by both Bessemer and open-hearth process have been laid in steam road track since its first offering in 1910, but as yet the results as to its wearing qualities and breakages are still largely unavailable. Many electric railway companies have also used this steel for girder rails and the results of all will be watched with much interest, for indications point to a cheap, hard, tough and ductile steel, which is much needed for rails.

It may be well here to mention the possibilities in using an increased amount of silicon in common open-hearth steel for rails. Steel with as high as 0.4 per cent of silicon, or double the high limit used in this country, is reported to have given excellent wearing results on English roads.

SPECIFICATIONS FOR SPLICE BARS FOR GIRDER AND HIGH T-RAILS

We regret that definite and well-considered specifications cannot be presented with this report. Your committee believes that proper specifications should provide for two grades of steel, one moderately soft, which may be used in the various patented bolted joints now on the market as well as with the softer grades of steel rail, the other quite hard and more suitable for use with the high carbon open-hearth rails, which are coming into more general use on electric roads. The latter grade will be somewhat more expensive than the former, owing to the necessity of punching them hot and also because all manufacturers are not equipped to do this hot punching. Proposed specifications for consideration at a meeting with representatives of manufacturers have been prepared by one of the members of the committee, but as they have not received the necessary consideration by the committee, they cannot receive the approval of the committee at the present time. These specifications are submitted as Appendix A of this report. This subject should be referred to the 1913 committee on way matters.

SPECIFICATIONS FOR OPEN-HEARTH GIRDER AND HIGH T-RAILS

The revised specifications of the association referred to in this report have been prepared by a joint committee consisting of a sub-committee of committee A-1 of the American Society for Testing Materials and a sub-committee of the committee on way matters of your association, and also manufacturers and consumers other than the representatives of your association. The revised specifications were approved by the American Society for Testing Materials at its annual convention held at New York, March 27-28, 1912, and have been put to letter ballot of the society. Final approval has been received and they are now in the hands of its form committee for such revision in form, though not in substance, as may seem desirable. The revised specifications are submitted as a part of this report under Appendix B.

In presenting these revised specifications the committee wishes to state that it agrees with the committee on way matters of 1910 and believes that uniform specifications will be of mutual benefit to consumers and manufacturers, that a high-carbon rail is desirable for use in city streets from an economical point of view, and that it may be used with safety in such service, although we do not wish to be understood as advocating the use of such rail in open or unpaved track under high-speed conditions.

Your committee recommends the revised specifications as "recommended practice," to supersede the present specifications approved in 1911.

THE USE OF T-RAIL IN STREETS

The committee on way matters in 1907 and 1909 collected data upon this subject, and in 1909 the report contains illustrations of improved methods of installation and paving, photographs of streets in various cities using T-rail and opinions of city engineers in different parts of the country relating to the use of this type of rail. The data collected by these committees have been mislaid, and it has been the purpose of this committee to collect new data upon this subject, to be filed in the records of the association for future use when needed. With this end in view your committee directed a circular letter to the officials of 140 different cities and another to member companies. Answers from seventy-two cities and from seventy-four companies were received and may be found in appendices "E" and "F" respectively.

During the present year the city of Cleveland has ordered some 1100 tons of Lorain Steel Company's Section 95-400 of T-rail for its paved streets, and the work which has been finished is satisfactory to the city authorities.

REVISION OF THE RULES AND REGULATIONS FOR THE GOVERNMENT OF EMPLOYEES OF THE WAY DEPARTMENT

These rules were submitted by the 1911 committee on way matters, and in conformity with the recommendations of that committee, circular letters were sent to all member companies under date of April 6, 1912, and asking for suggestions as to changes in these rules. But few replies have been received, and for the most part they stated that the rules had not been adopted. As these rules have been before the member companies but a short time, your committee considers it inadvisable to undertake their revision this year. It believes that the subject can be more intelligently and satisfactorily handled in

committee after some actual experience has been had in the use of these or similar rules, thereby giving evidence that rules of this description are considered necessary, and in addition this would furnish practical data upon which the committee can work.

Your committee therefore recommends that this subject be continued and be made a part of the work assigned to the 1912 committee.

RECOMMENDATIONS

Your committee recommends for adoption as "standard" the following:

1. Nine-inch girder-grooved rail, as shown in Fig. 1.
2. Seven-inch girder-grooved rail, as shown in Fig. 2.
3. Nine-inch girder-guard rail, as shown in Fig. 3.
4. Seven-inch girder-guard rail, as shown in Fig. 4.

The following are recommended for adoption as "recommended practice" by your committee:

1. Design for joint plates for 9-in. girder-grooved and girder-guard rail, as shown in Fig. 5.
2. Design for joint plates for 7-in. girder-grooved and girder-guard rail, as shown in Fig. 6.
3. The revised standard specifications for open-hearth girder and high T-rails, as shown in Appendix B.

APPENDIX A

PROPOSED SPECIFICATIONS FOR ROLLED STEEL JOINTS FOR GIRDER, HIGH T OR STANDARD T RAILS

Rolled steel joints shall be either grade "A" or grade "B" as particularly specified at the time of ordering.

1. *Physical Properties.*—Test pieces cut from finished joints selected at random by the inspector must show:

	"Grade A"	"Grade B"
Elastic limit, lb. per sq. in.	¼ ultimate strength	½ ultimate strength
Ultimate strength lb. per sq. in.	54-64,000	85-115,000
Elongation in 8 in.	25 per cent	10 per cent
Cold bending test without sign of fracture	Flat on itself	To angle of 45 deg.

2. *Chemical Properties.*—For the purpose of record, whenever possible, manufacturers shall furnish an analysis of each heat from which the joints have been made.

3. *Workmanship.*—The punching and notching of joints must be accurate in every respect to drawing and dimensions furnished.

Grade "A" joints may be punched and notched cold.

Grade "B" joints must be punched and notched hot and pains must be taken not to destroy the integrity of the metal in any way.

4. *Finish.*—All joints shall be smoothly rolled and true to templet. The name of the maker and year manufactured shall be rolled in raised letters on the side of the joint. The joints shall be sheared accurately to length and be free from mechanical defects, cracks, seams, flaws, fins and, on the whole, finished in a first-class, workmanlike manner. They shall be a perfect fit to the rails for which they are intended.

5. *Inspection.*—The inspector, representing the purchaser, shall have free access to the works of the manufacturer at all times while this contract is being executed and shall have all reasonable facilities afforded him that the joints are being furnished in accordance with the contract.

APPENDIX B

REVISED SPECIFICATIONS FOR OPEN-HEARTH GIRDER AND HIGH T-RAILS

Report showing the results of the consideration and discussion by sub-committee 1 of committee A-1 of the American Society for Testing Materials, of the specifications of the American Electric Railway Engineering Association for open-hearth girder and high T-rails. Messrs. Larned, Tilton and Gennett represented the American Electric Railway Engineering Association upon this sub-committee. Also, as amended and accepted by the American Society for Testing Materials at its annual meeting held March 27 and 28 at New York, and as adopted by letter ballot of the society and referred to its committee on form.

1. *General.*—The steel shall be made by the open-hearth process. The entire process of manufacture and testing shall be in accordance with the best standard practice, and special attention shall be given to the following specifications:

2. *Ingots.*—(*a*). A test ingot shall be cast, while each melt is being poured, from steel from the middle of the melt.

(*b*) No bled ingot shall be used.

(*c*) Ingots or blooms which show the effects of injurious treatment shall be discarded.

3. *Chemical Composition.*—The steel of which the rails are rolled shall conform to either of the following limits in chemical composition as may be called for in the contract:

	Class A	Class B
Carbon per cent	0.60 to 0.75	0.70 to 0.85
Manganese per cent	0.60 to 0.90	0.60 to 0.90
Silicon per cent, not over	0.20	0.20
Phosphorus per cent, not over	0.04	0.04

4. *Analyses.*—(a) The maker shall furnish the railway inspector daily, prior to shipment, with the chemical analysis for each melt, covering the elements specified under Section 3.

(b) Each analysis shall be made from drillings taken from the test ingot at not less than ⅛ in. beneath the surface.

(c) These analyses may be checked from time to time by the railway company's chemist, and the maker shall furnish, on request of the inspector, a portion of the test ingot or drillings therefrom for check analysis.

5. *Discard.*—(a) Sufficient material shall be discarded from the top of the ingot to obtain sound rails. Where the finished rails show piping they may be cut to shorter lengths until all evidence of this is removed.

(b) All metal from the top of the ingot, whether cut from bloom or rail, is the top discard.

6. *Branding.* The letters "O. H.," the weight of the rail, the section number, the name of the maker and the year and month of manufacture shall be rolled in raised letters and figures on the side of the web, and the melt number shall be plainly shown on each rail where it will not be covered subsequently by the splice bars.

7. *Straightening.*—(a) Rails on the hot beds shall be protected from water or snow, and shall be carefully manipulated to minimize cold straightening.

(b) The distance between the rail supports in the cold-straightening presses shall not be less than 42 in., except as may be necessary near the ends of rails. The gag shall have rounded corners to avoid injury to the rail.

(c) Any rail injured in cold-straightening, or showing gag marks therefrom, shall be rejected.

(d) "Lumpy"—that is, short kinked or wavy—rails shall be rejected.

8. *Finish.*—(a) Rails shall be smooth on the head, straight in line and surface, without any twists, waves or kinks, particular attention being given to having the ends without kinks or drop. The ends shall be milled square laterally and vertically, but the base may be undercut 1/32 in.

(b) All burrs or flow caused by drilling or sawing shall be carefully removed.

9. *Drilling and Punching.*—Circular holes for joint bolts, bonds and tie rods shall be drilled to conform accurately in every respect to the drawing and dimensions furnished by the purchaser. In class A rail, however, the tie rod holes may be punched.

10. *Section.*—(a) The section shall be ..... as shown in detail upon the attached plan and the cold templet of the manufacturer shall accurately conform to the specified section and shall at all times be maintained perfect.

(b) The section of the rail shall conform as accurately as possible to the templet and any variation therefrom shall be within the following limits:

Height, 1/64 in. under, 1/32 in. over.

Over-all width of head and tram ⅛ in. under or over, pro-

vided that said variation will not affect the gage line by more than 1/32 in.

Width of base ⅛ in. under, except that in flanges 6½ in. wide 3/16 in., and in flanges 7 in. wide ¼ in., variation will be allowed. When necessary, on account of form of track construction, and notice to that effect is given to the manufacturers, special care shall be taken to maintain the proper position of gage line with respect to outer edge of base.

(c) No variation will be allowed which will affect the fit of the splice bars.

(d) The base of the rail shall be at right angles to the web and shall not have a convexity greater than 1/32 in.

11. *Weight.*—(a) The weight of the rails per yard as specified in the order shall be maintained as nearly as possible after complying with paragraph 10, and the aggregate of the order shall not vary more than one-half of 1 per cent from the specified weight.

(b) Payments shall be based upon actual weights.

12. *Length.*—(a) The lengths of rails at a temperature of 60 deg. Fahr. shall be 60 ft. and 62 ft. for those sections in which the weight per yard will permit, unless otherwise specified. Ten per cent of the entire order will be accepted in shorter lengths, varying by even feet down to 40 ft. All rails shall be paired as to length before shipment.

(b) A maximum variation of ¼ in. over and under the specified lengths will be allowed.

13. *Drop-Testing Machine.*—The drop-testing machine shall be of the type recommended by the American Railway Engineering Association.

14. *Drop Tests.*—(a) Three rails from the top of ingots shall be selected by the inspector from each heat, from two of which a test specimen not less than 4 ft. or more than 6 ft. in length shall be cut.

(b) The test specimens shall be placed head upward on supports 3 ft. apart and shall be subjected to the specified fall of the standard tup (2,000 lb.), as follows:

	Fall in Feet	
	Class A	Class B
Rails weighing over 100 lb. per yd. and over 7 in. in depth	15	12
Rails weighing 100 lb. or less per yd. or 7 in. or less in depth	13	10

(c) The temperature of the test specimens, when tested, shall not be less than 60 deg. Fahr. nor greater than 120 deg. Fahr.

(d) The testing shall proceed concurrently with the operation of the mill.

(e) Drop tests shall be made of the two test specimens from each melt. Should both specimens withstand the test, all the rails from the melt which they represent shall be accepted. Should one of the two test specimens fail, the third rail selected shall be tested and if two of three specimens fail, all rails from the melt which they represent shall be rejected.

(f) The report of the drop tests shall state the atmospheric temperature at the time the tests were made.

15. *No. 1 Rails.* No. 1 rails shall be free from injurious defects and flaws of all kinds.

16. *No. 2 Rails.* (a) Rails which are rough on the head or which, by reason of surface or other imperfections, are not classed as No. 1 rails will be considered No. 2 rails, provided they do not, in the judgment of the inspector, contain imperfections in such number and of such character in any individual rail as to render such rail unfit for recognized No. 2 rail uses, and provided such rails meet the requirements of paragraph 10 of these specifications.

(b) Rails shall not be accepted as No. 2 rails having flaws of more than ¼ in. in depth in the head or more than ½ in. in depth in the base.

(c) No. 2 rails will be accepted to the extent of 10 per cent by weight of the entire order.

17. *Distinguishing Marks.*—Both ends of all short-length No. 1 rails shall be painted green.

Both ends of all No. 2 rails shall be painted white and shall have two heavy center-punch marks on the web of the rail at such a distance from both ends that they will not be covered by the joint plates.

18. *Handling and Loading.*—(a) All rails shall be loaded in the presence of the inspector, and shall be handled in such a manner as not to bruise their flanges or cause other injuries.

(b) Rails of each class shall be placed together in loading.

19. *Inspection.*—The inspector representing the purchaser shall have free entry to the works of the manufacturer at all times while his contract is being executed, and shall have all reasonable facilities afforded him by the manufacturer to satisfy him that the rails are being made in accordance with the terms of the contract. All tests and inspections shall be made at the place of manufacture, prior to shipment, and shall be so conducted as not to interfere unnecessarily with the operation of the mill.

APPENDICES C AND D

[These contain copies of the circular letters sent to city engineers and to member companies on the use of T-rail in paved streets.]

APPENDIX E

TABULATION OF REPLIES RECEIVED FROM CIRCULAR LETTER TO CITY OFFICALS REGARDING RAIL IN PAVED STREETS

City	City Official Responding	Type of Rail Used	Remarks
ALABAMA:			
Birmingham	City engineer.	Shanghai T....	
CALIFORNIA:			
Los Angeles...	City engineer.	Girder	City ordinance passed Dec. 5, 1911, prohibits T-rail in paved streets.
San Francisco	City engineer.	Girder-grooved .	Formerly used T-rail.
COLORADO:			
Colo. Springs.	City engineer.	.....	Have no paved streets.
CONNECTICUT:			
Bridgeport ..	City engineer.	T-rail	
Hartford	City engineer.	Girder	T-rail prohibited by contract with electric railway company.
New Haven .	City engineer.	Shanghai T	
DISTRICT OF COLUMBIA:			
Washington .	Asst. of engineers commission.	Grooved Trilby..	T-rail prohibited by Commissioners of the District of Columbia.
FLORIDA:			
Jacksonville ..	Chief city engineer.	T-rail	Now want grooved rail.
GEORGIA:			
Atlanta	Chief engineer of construction.	Grooved and T-rail.	
ILLINOIS:			
Peoria	City engineer.	Girder	No T-rail in city, but can be overruled.
Springfield ..	City engineer.	Shanghai T ...	
INDIANA:			
Evansville ...	City engineer.	Shanghai T ...	
Fort Wayne .	City engineer.	T-rail	
Indianapolis .	Chief engineer	T-rail	
IOWA:			
Davenport ...	Commission of public works	Shanghai T ...	Prior to 1907 T-rail was prohibited by ordinance.
KANSAS:			
Kansas City..	City engineer.	Girder	
KENTUCKY:			
Lexington ...	City engineer.	Shanghai T ...	
Louisville ...	Chief engineer	Girder-grooved .	
LOUISIANA:			
New Orleans.	Asst. city engineer.	Girder	Used in all paved streets.
MAINE:			
Portland	City engineer.	Girder	Want to use T-rail; referred to general manager.
MARYLAND:			
Baltimore ...	City engineer.	Girder-grooved .	
MASSACHUSETTS:			
Boston	Chief engineer	Girder and T-rail.	Mostly girder rail in paved streets.
Brockton	City engineer.	Girder	T-rail not prohibited by ordinance.
Cambridge ...	City engineer.	Girder	No T-rail used.
Holyoke	City engineer.	Girder-grooved .	Formerly allowed T-rail
Lawrence ...	City engineer.	Girder-grooved .	
New Bedford.	City engineer.	Girder-grooved .	City engineer inclined to favor girder rail.
Springfield ..	City engineer.	Girder	City engineer inclined to favor T-rail in paving. None in use at present.
Worcester ...	City engineer.	Girder and T-rail.	Very little T-rail used.
MICHIGAN:			
Detroit	City engineer.	T-rail	
Grand Rapids.	City engineer.	T-rail	
Saginaw ...	City engineer.	T-rail	

City	City Official Responding	Type of Rail Used	Remarks
MINNESOTA:			
Duluth	City engineer.	Shanghai T	
Minneapolis	City engineer.	Shanghai T	
St. Paul	Commission of public works	Shanghai T	
MISSOURI:			
St. Joseph	City engineer.	Shanghai T	Both girder and T-rail allowed.
St. Louis	Chief commissioner	Girder and T-rail.	T-rail not used entirely.
NEBRASKA:			
Lincoln	City engineer.	T-rail	
Omaha	City engineer.	Girder	
NEW JERSEY:			
Elizabeth	City engineer.	Girder	No T-rail used.
Paterson	City engineer.	Girder	
NEW YORK:			
Buffalo	Deputy, engineer commission.	Girder	No T-rail used.
Elmira	Asst. city engineer.		Nothing special.
Rochester	City engineer.	Girder and T-rail.	
Schenectady	City engineer.	T-rail	
Syracuse	City engineer.	Shanghai T	
Utica	Deputy city engineer.	T-rail	
Yonkers	City engineer.	Girder	No T-rail used.
NORTH CAROLINA:			
Charlotte	City engineer.	Shanghai T	
OHIO:			
Cincinnati	Chief engineer Dept. Public Service.	T-rail and girder.	T-rail no longer allowed.
Cleveland	Chief engineer Dept. Public Service.	Girder-grooved rail.	City authorities have now authorized use of T-rails in paved streets.
Columbus	Chief engineer Dept. Public Works.	Girder-grooved and T-rail.	T-rail prohibited by city ordinance, passed June 10, 1907.
OREGON:			
Portland	City engineer.	Girder-grooved and Shanghai T	
PENNSYLVANIA:			
Harrisburg	City engineer.	Girder-grooved and tram.	
Philadelphia	Chief engineer and surveyor.	Girder	No T-rail used in paved streets.
Reading	City engineer.	Girder	No T-rail used. City engineer favors use of T-rail in paved streets.
Scranton	City engineer.	Shanghai T	
Wilkes-Barre	City engineer.	Girder and T-rail.	T-rail only partly used.
York	City engineer.	Trilby-grooved-girder.	
RHODE ISLAND:			
Providence	City engineer.	Girder-grooved	No T-rail used, prohibited by city.
SOUTH CAROLINA:			
Charleston	City engineer.	Girder-grooved and T-rail.	
TEXAS:			
Dallas	City and county engineer.	Girder-grooved and T-rail.	
TENNESSEE:			
Knoxville	City engineer.	Girder-grooved and T-rail.	
UTAH:			
Salt Lake City	City engineer.	Shanghai T	
VIRGINIA:			
Richmond	City engineer.	Girder-grooved	
WASHINGTON:			
Seattle	City engineer.	Shanghai T	
Spokane	City engineer.	T-rail	
Tacoma	City engineer.	Shanghai T	
WISCONSIN:			
Superior	City engineer.	T-rail	
HAWAII:			
Honolulu	City engineer.	Girder	City engineer prefers T-rail for paved streets.

APPENDIX F

TABULATION OF INFORMATION RECEIVED FROM REPLIES TO DATA SHEET SENT TO MEMBER COMPANIES.

Name of Company.	City	Total City Mileage Operated	Total Mileage of T-Rails Laid in Paved Streets	Average Age in Yrs. of T-Rails Laid in Paved Streets
ALABAMA:				
Birmingham Light & Power Co.	Birmingham	52.1	5.7	15
Mobile Lt. & R. R. Co.	Mobile	116.7	16.4	9
CALIFORNIA:				
Los Angeles Ry. Corp.	Los Angeles	351.0	131.0	6-10
COLORADO:				
Arkansas Valley Ry. Lt. & Pwr. Co.	Pueblo	35.0	4.8	6
DISTRICT OF COLUMBIA:				
Washington Ry. & Elec. Co.	Washington	46.7	0.1	3
GEORGIA:				
Athens Ry. & Elec. Co.	Athens	9.3	3.5	6
Georgia Ry. & Power Co.	Atlanta	158.7	55.8	10
Savannah Electric Co.	Savannah		32.4	8
ILLINOIS:				
Central Ill. Public Service Co.	Mattoon	3.0	3.0	7
E. St. Louis & Suburban Ry.	East St. Louis	44.5	2.3	2
Galesburg & Kewanee El. Ry. Co.	Kewanee	5.0		5
INDIANA:				
Chicago, So. Bend & No. Ind. Ry.	South Bend	60.0	60.0	20
Indianapolis Trac. & Terminal Co.	Indianapolis	142.0	36.1	4
Muncie & Portland Trac. Co.	Portland	2.0	2.0	
IOWA:				
Des Moines City Railway Co.	Des Moines	85.0	14.0	
Mason City & Clear Lake R.R.Co.	Mason City	6.0	2.0	1-9
Waterloo, Cedar Falls & N. Ry. Co.	Waterloo	25.5	8.5	4
KANSAS:				
Kansas City-Western Ry. Co.	Leavenworth	18.0	14.0	4
MAINE:				
Rockland, Thomaston & Camden St. Ry. Co.	Rockland	22.5	1.0	19
MICHIGAN:				
Grand Rapids Railway Co.	Grand Rapids	63.7	13.6	4
Houghton County Traction Co.	Houghton	8.9	1.7	10
Menominee & Marinette Lt. & Tr. Co.	Menominee	19.2	4.5	5
Saginaw Bay City Ry. Co.	Saginaw	24.8	12.1	
MARYLAND:				
Cumberland & Westernport El. Ry.	Cumberland	1.7	0.1	
MINNESOTA:				
Twin City Rapid Transit Co.	Minneapolis	313.0	164.7	
MISSISSIPPI:				
Vicksburg Traction Co.	Vicksburg	10.0	3.8	2
MISSOURI:				
United Rys. Co. of St. Louis.	St. Louis	348.3	1.5	7
NEW JERSEY:				
Bridgeton & Millville Trac. Co.	Bridgeton	9.0	1.0	8
NEW YORK:				
Brooklyn Rapid Transit Co.	Brooklyn	392.3	8.9	
Fonda, Johnstown & Gloversville R. R. Co.	Gloversville	15.5	15.3	20
Hudson Valley Railway Co.	Glens Falls	7.1	3.1	4-5
Ithaca St. Ry. Co.	Ithaca	10.5	3.0	5
Kingston Consolidated Ry. Co.	Kingston	7.9	7.9	2
New York State Rys.	Rochester	139.4	9.1	3
Schenectady Railway Co.	Schenectady	39.2	3.4	3
Syracuse, Lake Shore & No. R. R.	Syracuse	21.3	8.7	4
Utica & Mohawk Valley Ry. Co.	Utica	66.4	21.3	6+
OHIO:				
Cleve., Painsville & East. Ry. Co.	Willoughby	280.0	2.0	6
Cleveland Railway Co.	Cleveland	*		
Northern Ohio Trac. & Lt. Co.	Akron	215.0	6.0	
Scioto Valley Traction Co.	Columbus	3.5	2.6	
PENNSYLVANIA:				
Altoona & Logan Valley El. Ry.	Altoona	21.0	1.4	6
Buffalo & Lake Erie Trac. Co.	Erie	73.3	26.8	14
Phila. & West Chester Trac. Co.	Upper Darby		0.8	6
Pittsburgh Railways Co.	Pittsburgh	473.7	2.7	
Scranton Rys. Co.	Scranton	39.5	30.5	2.4
Valley Traction Co.	Lemoyne		.0	
RHODE ISLAND:				
Rhode Island Co.	Providence	162.4	39.6	
TENNESSEE:				
Chattanooga Ry. & Lt. Co.	Chattanooga	25.0	13.0	7
Johnson City Trac. Co.	Johnson City	5.5	2.2	2
Knoxville Ry. & Lt. Co.	Knoxville	29.7	6.3	5
TEXAS:				
Austin Street Ry Co.	Austin	18.7	2.8	5
Texarkana Gas & Elec. Co.	Texarkana	11.0	12.0	10
VIRGINIA:				
Roanoke Ry. & Elec. Co.	Roanoke	15.0	15.0	1.5
WASHINGTON:				
Everett Ry. Lt. & Water Co.	Everett	15.4	15.4	
Olympia Lt. & Pr. Co.	Olympia	5.0	1.4	2
Whatcom County Ry. & Lt. Co.	Bellingham	24.0	10.7	
WEST VIRGINIA:				
Appalachian Power Co.	Bluefield	5.4	2.4	4
Fairmont & Clarksburg Trac. Co.	Fairmont	16.3	6.1	7
WISCONSIN:				
Duluth Street Railway Co.	Superior	80.4	77.8	12
Milwaukee El. Ry. & Lt. Co.	Milwaukee	143.8	143.8	10
CANADA:				
Halifax Elec. Tram. Co. L'td.	Halifax	14.5	14.5	7
Ottawa Elec. Ry. Co.	Ottawa	31.5	19.0	1-16
MEXICO:				
Mexico Tramways Co.	Mexico City	100.5	24.7	12

Although acetylene gas was discovered in 1836, it was not until 1892 that its commercial development was made possible by Willson, who discovered a method of producing calcium carbide in large quantities. The application of acetylene to heating and power has been very recent indeed, and the use of acetylene and oxygen in the blow-pipe has produced almost the highest temperature known to chemistry—a temperature approximating that of the electric arc, probably above 6,000 deg. Fahr. Through this means welding has been successfully accomplished and several other important industrial applications have been found. Large steel bridge girders can thus be cut apart with ease, and in electric and steam railway repair work the value of oxyacetylene welding for a wide variety of uses is rapidly becoming realized.

REPORT OF THE COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES*

BY R. E. DANFORTH, CHAIRMAN; C. E. LEARNED, J. T. CRABBS, C. B. WELLS, C. S. KRICK, M. J. FERON AND BRUCE CAMERON, COMMITTEE OF THE TRANSPORTATION & TRAFFIC ASSOCIATION

Preparatory to the actual work of carrying out the instructions of the executive committee, your committee made a study of the work of the previous committees which have considered the subject of the training of transportation employees.

RECOMMENDATIONS AND PRACTICE COMPARED

A comparison of the actual practices of the member companies with the recommendations of the previous committees indicates a tendency to adhere to the standards suggested by the committees, examples of the trend toward standardization being shown in the close adherence to the 1908 committee's recommendation as to age limit, height and weight of motormen and conductors.

The 1908 committee's recommendations prescribe age limits of from 21 to 40 years, while the development from records of companies submitted shows that the average age limit on city lines is 21.5 years as a minimum to 40.4 years as a maximum. Similar comparison of age limits on interurban lines, 21.8 years as a minimum and 39.6 years as a maximum.

Close adherence to the committee's recommended height limit of 5 ft. 6 in. as a minimum is shown by the general average of city companies of 5 ft. 6 3-5 in. minimum and of interurban lines of 5 ft. 6½ in. minimum.

The recommended minimum weight for conductors of 130 lb. and 150 lb. for motormen is closely followed, city companies averaging 140 lb. minimum for conductors and 150 lb. minimum for motormen. The difference between 130 and 140 lb. is due to the higher minimum as maintained by companies which operate from 50 to 100 cars, other classes coming very close to the minimum recommended by the committee.

DATA SHEET

Your committee, after reviewing the work already accomplished by preceding committees, developed an inquiry sheet requesting information concerning organization of the transportation department, the selection of trainmen, statistics of length of service and supervisory force. This data sheet was sent to all member companies, 112 companies replying. On the information obtained the committee bases its report.

The information furnished by the member companies has been analyzed and for comparative purposes the analysis classifies the companies reporting into city and interurban classes, city lines being further subdivided into six groups, as follows: Group A, roads operating 50 cars and under; group B, roads operating 50 to 100 cars; group C, roads operating 100 to 250 cars; group D, roads operating 250 to 500 cars; group E, roads operating 500 to 1,000 cars; group F, roads operating 1,000 cars and over; group G, interurban roads. A study of the analysis follows.

ORGANIZATION OF TRANSPORTATION DEPARTMENT

Replies to the request for a chart showing organization of the transportation department from companies operating fifty cars and under naturally indicate less sharply defined organizations than the replies from companies operating a large number of cars. The tendency on the smaller roads is to make the operating force responsible for the work of such other departments as are most closely related to the transportation department. As the companies grow in size, the duties of the transportation department organization become more clearly defined, and in companies of the largest size the organization becomes highly specialized. Typical organization charts are shown in an appendix to the report.

*Abstract of report read before the American Electric Railway Transportation & Traffic Association, Chicago, Oct. 7-11, 1912.

SELECTION OF TRAINMEN

Selection of trainmen and records of qualifications for employment as trainmen relating to age limits, height and weight are covered in the comparison of previous committee recommendations with reported practices of the member companies. Replies as to the physical condition, color sense and hearing requirements indicate that ability to pass a good physical examination is deemed of more importance by city companies than sight, color sense and hearing, while reports from interurban companies indicate that examination for sight, color sense and hearing are also considered essential on interurban lines.

To the inquiry "Have you difficulty in securing a sufficient number of men with these qualifications?" a majority of the companies report that they do not have difficulty in securing sufficient men with the necessary qualifications. As a rule, companies reporting difficulty in securing men are those having a narrow range in age limits or an extraordinary height or weight limit, one company reporting that only men between 22 and 28 years of age are employed. A number of companies attribute the scarcity of men measuring up to the required standard to the condition of the labor market. There is apparently a wide variation in the requisites in the selection of trainmen, the tendency being to multiply the requirements as the company grows in size. This tendency doubtless arises from the fact that the volume of business handled in employing new men calls for organized methods where the amount of work justifies the establishment of a regular employment bureau with the natural result that more time and attention follow where the work is thus specialized. While the methods adopted may vary, it is nevertheless apparent that such variations should not exist in the requirements themselves, for the character of the work to be done is pretty much the same everywhere, and the type of man to perform it should be equally a constant.

INSTRUCTION OF TRAINMEN

Only a limited proportion of the companies reporting state that they give schoolroom instruction, a number reporting preliminary instruction to student before placing on the car for actual practice. The use of the school car is apparently limited to a few companies, the practice in most cases being to instruct the student on cars running in daily service.

There appears to be a wide latitude in what is considered to be a proper length of time for a student to be under instruction. This variation seems reasonable, however, when we consider the degree of alertness and efficiency necessary to operate a car properly through congested city streets or at high speed in interurban service as compared with the conditions obtaining in smaller places.

The general tendency seems to be toward the use of several instructors in the training of a new employee rather than placing his instruction in the hands of one man. While a number of instructors are utilized successfully for a single individual, it seems preferable that at least the fundamentals be taught the prospective trainmen by one instructor, as that instructor can be made more responsible for covering the entire ground than when this responsibility is divided among a number of instructors. Out of 106 companies answering this question, 77 per cent report the use of more than one instructor.

Examination of the trainmen after the breaking-in period is oral on a majority of the roads reporting, with a goodly number requiring both oral and written examination; if an attempt is made to cover in a written examination immediately after the breaking-in period the various details involved in a trainman's work, few will be found who can pass a rigid examination successfully; if less than a rigid examination is accepted, only certain fundamentals may be covered, leaving the details with an insufficient check to establish the individual's familiarity with them. It would seem preferable that a rather complete oral examination be conducted at intervals following the completion of the breaking-in period, followed

by a written examination at a later period, by which time the trainman may have been able to absorb the previous details required.

Tabulated replies to the inquiry of the committee regarding the subject of instruction appear as an appendix to the report.

INSTRUCTION OF TRAINMEN BY SCHOOL ROOM, SCHOOL CAR AND ACTUAL OPERATION

Group	City Lines A	B	C	D	E	F	Total for City	Interurban Lines, One Class
Minimum number of hours allowed for school room:								
Number of companies having school room	2	3	7	1	5	3	21	7
Number of companies having no limit	1	2	2	0	1	1	6	3
Number of companies having minimum period	1	1	5	1	4	2	14	4
Average length in hours	2	40	6.3	5	17.5	9.5	11.97	5.75
Minimum number of hours allowed for school car:								
Number of companies having school car	1	2	8	2	3	5	21	11
Number of companies having no limit	1	2	2	0	1	2	8	5
Number of companies having minimum period	0	0	6	2	2	3	13	6
Average length in hours	0	0	9.66	79	5.5	9.66	19.70	81.3
Minimum number of hours allowed for instruction in actual operation:								
Number of companies reporting	15	11	16	3	10	6	61	39
Number of companies having no minimum	13	6	6	0	0	2	27	10
Average length of minimum instruction speriod in hrs.	185	94	111	102	102	84	106.2	127.8

From replies received, final approval of the new trainman seems to be in most cases the duty of the highest ranking official of the transportation department, dependent on the size of the company. Uniformity seems desirable, for which reason this work should be left to a single individual, if possible.

A majority of companies report no probationary period, the general practice being to put the new employee to work and decide as to his fitness by subsequent observations. As an impetus to diligent attention, probationary service is of value. If an employee realizes that it is up to him to make good on the job, and that he is given a reasonable length of time to demonstrate his fitness therefor, he is more liable to show interest than when railroaded into a permanent position.

SUPERVISION OF TRAINMAN

A majority of the city companies report that the supervision of trainmen in the discharge of their duties is performed by the supervisors and a uniformed street force. On interurban lines much of the trainmen's work comes under the observation of the trainmaster and dispatcher, but few companies reporting definite methods.

There appears to be a lack of "follow-up" system. This results in erratic treatment and violations, the latter developing ultimately into "habits" which are detrimental to efficient service. That system is the best which checks itself to insure against lax methods dependent upon individual conception of subordinate officials. The general opinion prevails that the trainmen should not be reprimanded while on duty or at least not in the hearing of passengers.

The practice of reporting violators to the superintendent is very generally observed. The treatment of continual violators of instructions varies greatly; a number of roads remand the violator for further instruction, compelling him to break in again under an instructor, while others require him to appear before the general manager or other official empowered with authority to discharge.

Replies concerning supervision of trainmen are attached as an appendix to the report.

HANDLING OF TRAINMEN

The disciplining of trainmen by suspension prevails on a majority of roads; placing men on the extra list is another form of discipline in vogue.

From replies received, it is apparent that up to the present time the merit and demerit system has not been adopted by many companies as a method of applying discipline. The results reported by companies using it vary greatly as to results obtained. One of the greatest values of the merit and demerit system arises in its furnishing a complete operating record and in giving complete knowledge of an employee's performance, not obtainable in any other way. The policy of many companies is to discipline by means of suspension. Whether proper discipline can be maintained without suspension is a mooted question. Much value is apparently placed on the "heart to heart" talk between the official and the employee, a number of companies commenting on this form of discipline.

On a majority of roads the application of discipline rests with the superintendent, who also makes discharges. Few roads report having a schedule of penalties for infraction of rules.

There appears to be a difference of opinion as to whether men should be re-employed after once being discharged, a number of companies reporting that they have no definite ruling, each individual case being considered in the light of the employee's previous record. The influence exerted by the discharge of an employee extends beyond the employee himself and affects very often the organization from which he is separated. For this reason, authority to discharge should be vested in some official (in a large company in a commission) sufficiently broad-gaged to interpret evidence and appreciate the effect which hasty action produces.

A tabulation of replies relative to handling of trainmen is given as an appendix to the report.

SERVICE OF TRAINMEN—INSTRUCTION AND PROBATION PERIOD, ETC., FIRST SIX MONTHS

Group	Number of Conductors and Motormen Hired First Six Months	Number Left at End of Six Months	Number Dropped as Incompetent	Number of Men Resigning	Number of Men Discharged	Per Cent of Men Resigning to Number Hired	Per Cent of Men Dropped as Incompetent to Total Hired	Total Number Leaving, All Kinds	Per Cent of Total Discharged to Total Leaving	Total Hired for Fiscal Year	Total Resigning and Discharged for Year	Per Cent of Resignations and Discharges to Total Hired for Year
A	182	57	6	63	17	24.60	3.19	86	19.76	282	229	81.2
B	399	177	8	60	9	15.00	2.00	77	11.70	647	462	71.5
C	1,861	905	51	410	53	22.00	2.74	514	10.31	3,511	2,940	83.7
D	....	.....	...	.....	...	.....	....	.....	.....	.....	.....	....
E	2,854	1,086	59	731	145	25.62	2.07	935	15.50	4,808	4,184	86.8
F	5,887	2,928	378	1,175	326	20.00	6.42	1,879	17.37	11,576	10,517	91.2
Total, city	11,183	5,153	502	2,442	550	21.86	4.50	.....	15.72	20,624	18,332	88.8
G, interurban	679	443	33	47	24	6.92	6.92	104	23.07	1,240	721	58.2

BONUS SYSTEMS

The giving of bonuses as a reward for satisfactory service has not become general practice; a number of roads, however, report various methods of encouraging meritorious work, one giving cash prizes for the best papers written by employees on accident prevention, while another reports a division among the employees of the balance from the damage fund when the cost of accidents falls below a certain amount. The practice of furnishing free uniforms is restricted to comparatively few companies. Benefit associations are in operation on a large number of roads and are increasing. A number of companies are pensioning old employees, but few as yet have

added the insurance feature. A tabulation of replies relative to bonus systems is attached as an appendix to the report.

RECORDS

A complete exhibit of blanks used in the selection of, appointment, assignment and instruction of new men has been collected and is available for inspection by the association members.

LAWS AND REGULATIONS

A number of companies submitted copies of city and state laws having to do with the employment and service of trainmen and a digest of these laws is obtainable at the office of the secretary.

STATISTICS AND LENGTH OF SERVICE

In the development of information concerning length of service of trainmen, the committee has been greatly hampered by the lack of complete data, a number of companies having apparently not given this subject the attention it deserves. Failure to give complete information made it necessary to eliminate from the analysis all companies excepting those making full reports. The figures presented show that the group F roads lose by resignation and discharge 91.2 per cent, as compared with the total number employed per year, while at the same time the group F roads show 59.40 per cent of their men in service over five years, indicating that the service losses are confined principally to the new men.

The difference between city and interurban conditions is shown by the fact that only 58.2 per cent are lost by resignation and discharge on the interurban lines, as compared with 88.8 per cent lost in a similar manner by the city lines. The higher percentage of men in city service over five years, as compared with interurban service, is probably due to the fact that the interurbans are a comparatively new institution.

SUPERVISION OF TRAINMEN AFTER PERMANENT EMPLOYMENT

	Group A	B	C	D	E	F	Total City Lines	Interurban Lines	Grand Total	Per Cent of Total
Number of companies replying	17	11	16	4	11	6	65	36	101	....
Looked after by—										
Inspectors and road officers	9	11	13	4	11	6	54	17	71	70.4
Superintendent transportation, trainmaster, etc.	1	0	1	0	0	0	2	12	14	13.8
General superintendent	7	0	2	0	0	0	9	7	16	15.8

THE USE OF SO-CALLED MERIT AND DEMERIT SYSTEMS FOR TRAINMEN

	Group A	B	C	D	E	F	Total City Lines	Interurban Lines	Grand Total	Per Cent of Total
Companies replying	18	11	16	4	11	6	66	43	109	.....
Replying yes	2	0	3	0	1	2	8	7	15	13.76
Replying no	15	11	12	4	10	4	56	36	92	84.40
Have under consideration	1	0	0	0	0	0	1	0	1	0.92
Demerit system only	0	0	1	0	0	0	1	0	1	0.92

WELFARE PLANTS IN EFFECT

	Group A	B	C	D	E	F	Ttl. City Lines	Interurban Lines	Grand Total	Per Cent of Ttl.
Number companies replying	14	11	15	4	10	6	60	40	100	..
Number reporting yes	7	8	11	2	6	4	38	18	56	56
Divided as follows:										
Benefit association	3	7	7	2	6	4	29	16	45	45
Insurance system	0	0	1	0	0	1	2	1	3	3
Pension system	2	2	3	0	2	3	12	3	15	15
Hospital fund	1	1	1	0	0	0	3	1	4	4
Company doctor, free service	1	0	1	0	0	0	2	0	2	2
Club rooms	0	0	2	0	0	0	2	1	3	3
Special cash donations to needy employees	0	0	1	0	0	1	2	0	2	2

SUPERVISORY FORCE

A gratifying number of companies report the promotion of men from the ranks to supervisory positions. The qualifications most frequently specified are good character, good appearance, familiarity with the duties required and executive ability. The training of the supervisory force seems to fall in most cases upon the superintendent. Inquiries as to methods of training the supervisory force were too often answered by "No special training." The general method of following up work of the supervisory force consists in personal observation of their work by the superintendent. No satisfactory training of platform men can be expected if the education of the supervisory force is neglected; special training of the supervisory force is just as necessary and essential as is that of the trainmen.

CONCLUSIONS

The conclusions of the committee in regard to the various questions considered are as follows:

SELECTION

Too many new men are hired each year, due to one or more of the following causes:

(a) Careless selection: This is shown by the fact that 30.4 per cent of men employed either do not qualify or are dismissed within six months.

(b) Incomplete training: Statistics show that a large proportion of the accidents costing $100 or more to settle are caused by the new and untrained employees. A high percentage of rule violations by untrained employees is due to their lack of knowledge of such rules.

(c) Lack of encouragement: A lack of personal interest in the new trainman is shown by the fact that 21 per cent of them resign during the first six months.

(d) Too much punishment: Too much punishment and not enough education are responsible for many men leaving the service. This is apparent from the fact that 31.3 per cent of the men resign or are dismissed during the first six months.

INSTRUCTION

(a) Uniform standard of instruction: There should be uniformity of training. It is best secured by fundamental instruction of students from one instructor only. Training course should be carefully worked out and instructors required to adhere to it.

(b) Probationary period: A probationary period of at least sixty days is deemed advisable, at which time a re-examination of the employee should take place.

SUPERVISION

(a) Follow-up methods: Close observation of the work of new trainmen is necessary, with systematic methods of ascertaining and correcting weaknesses and "habits."

WELFARE

(a) Hours of service for regular men: Hours of service should be made as near ten hours in twelve as can be done with due regard to traffic requirements, taking into account also the welfare of relief crews and extra men.

(b) Relief crew: Work of relief crews should be restricted to not over ten hours' work, to be completed in fifteen hours; such crews should have first chance, in order of seniority, to fill regular runs.

(c) Selection of runs: Selection of runs should be made by trainmen in order of seniority.

(d) Extra men: Extra men should work on a rotating daily list.

RELATION OF TOTAL TRAINMEN HIRED (ONE YEAR) TO TOTAL IN SERVICE

Group	Number of Companies	Average Number of Employees for the Fiscal Year	Conductors and Motormen Hired During Year	Per Cent of New Men Hired to Total	Number of Employees in Service More than One Year	Per Cent of New Men to Older Men
A—1-50	9	430	282	65.6	314	89.9
B—50-100	8	1,247	647	51.8	835	77.4
C—100-250	9	4,178	3,511	84.0	2,784	125.8
D—250-500	0	....	....	....	....	.....
E—500-1000	6	7,022	4,808	68.5	4,433	108.6
F—over 1000	4	17,421	11,576	66.4	12,963	89.2
Total city lines	36	30,298	20,624	68.2	21,329	96.8
G, Interurban	19	3,110	1,240	39.9	2,249	55.2

(e) Surroundings: Work should be made attractive by good quarters, with sanitary arrangements, sick benefits and insurance, together with pensions whenever possible.

SUPERVISORY FORCE

(a) Selection: Selection for supervisory position should be made from the ranks wherever possible as a recognition of good service, as encouragement to fellow employees, and from the value of knowledge already gained concerning local methods of operation.

(b) Examination: Oral and written examination covering the duties about to be assumed should take place before appointment.

(c) Conferences: Monthly conferences should be held with the head operating officials in order that broad views may be established regarding management of men and operating requirements.

(d) Teachings: The supervisory official should be taught courtesy, punctuality, loyalty, diligence and enthusiasm by superiors; he should have it thoroughly inculcated in him that the greatest crime is to be unfair to a subordinate.

(e) Follow-up methods: Insufficient attention seems to be paid to following up the work of supervisory officials, this practice being limited largely to platform employees.

The sphere of influence of supervisory officials is so extended that an intimate knowledge of their methods should be had with the view of correcting errors of omission and commission. This is even more important than in the case of trainmen themselves. That method best suited to local conditions should be the one adopted by individual companies.

(f) Judgment of work: The percentage of men lost each year is one criterion of the supervisory official's work. He who frequently changes men is handicapped by the poor work of inexperienced employees and suffers from disloyalty and lack of team work by his platform force. The work of the supervisory official is also judged by public opinion of the divisional operation; if the public does not complain of the service and cash returns and expenses are satisfactory, the supervisory official has placed many points to his credit.

The foregoing fundamentals are considered to be of vital importance and can be secured only by conscientious training and treatment of the individual unit. The thoroughness with which this is accomplished determines the degree of success in the broader principles of policy and management.

Your committee feels under obligation to the former chairman of the committee, J. W. Brown, and to the secretary of this association, H. C. Donecker, for their valuable assistance, and to the member companies for their sympathetic response in forwarding the valuable data which form the basis for this report.

Your committee has also co-operated with a committee from our affiliated Claim Agents' Association.

CLOSING SESSION OF THE CLAIM AGENTS' ASSOCIATION

Following the joint session of the Claim Agents' Association with the Transportation & Traffic Association, the report of the committee on safety leagues, which is abstracted elsewhere in this issue, was presented. This was followed by papers upon the education of the employees, by J. R. Pratt, United Railways & Electric Company, of Baltimore, and upon the education of the public and the education of school children by Frederick S. Hughes. These are also given in abstract elsewhere in this issue. J. J. Reynolds, Boston Elevated Railway Company, and Mrs. Ida P. Newel, Portland Railway, Light & Power Company, presented written discussions upon the general subject of education which are abstracted elsewhere in this issue. After this the association took up the report of the index bureau.

REPORT OF INDEX BUREAU

The report of the committee on index bureau said that there has been a substantial increase in the number of cases recorded and a corresponding increase in the number of references returned. It said that 21,765 reports of personal inquiry claims from companies in all parts of the continent have been received for the twelve months ended Sept. 30, 1912, against 17,797 for the previous twelve months, an increase of 3,968. Out of these reports 2288 references were returned to the companies against 1491 for the preceding twelve months, an increase of 797. The report gave an outline of the rules followed by the bureau. They were briefly as follows: Report all personal injury claimants; render your reports promptly; give all information called for on blanks, but do not withhold report because you have not this information; address your blanks to the secretary of the American Electric Railway Association and secure blanks from him.

The Hooper-Holmes Information Bureau now has in its files 2,400,000 records from all parts of the United States and Canada. Practically all the casualty companies report consistently to the bureau, as do also many steam railway and other corporations, including our member companies. "We cannot afford to be without this service. Let us get together and be able to show even more progress in the work during the coming year than we have been able to report here to-day," the report added.

The report was signed by H. V. Drown, chairman; Cecil G. Rice, F. J. Whitehead, M. P. Spillane, B. B. Davis, committee on index bureau.

CHANGE OF NAME

The association then voted to change its name to that of the American Electric Railway Claims Association, and the organization will hereafter be known by the latter title.

NEW OFFICERS

The nominating committee then reported the following names as officials of the association during the ensuing year: For president, C. A. Avant, claims attorney Birmingham Railway, Light & Power Company; for first vice-president, W. F. Weh, superintendent accident department, Cleveland Railway Company; for second vice-president, W. Tichenor, claim agent Terre Haute, Indianapolis & Eastern Traction Company; for third vice-president, George Carson, claim agent Puget Sound Traction, Light & Power Company; for secretary-treasurer, B. B. Davis, claim adjuster Columbus Railway & Light Company. These nominees were unanimously elected.

President Avant then addressed the association, and motion was made to thank the retiring president and the other officers and committees for their efficient manner of conducting the business of the past year. The president appointed the following committees for the ensuing year: Executive committee, P. C. Nickel, R. E. McDougall, Cecil G. Rice, Edward P. Walsh; subjects committee, H. V. Drown, C. B. Hardin, H. K. Bennett. The president announced that he would appoint other committees later on. The convention photograph was then taken and the association adjourned for the year.

The new carhouse of the Louisville (Ky.) Railway, at Thirty-first Street and Broadway, Louisville, was built to accommodate the cars of the West Broadway, Greenwood Avenue and other southwestern suburban lines. It fronts for 100 ft. on Broadway and extends for more than 200 ft. south to Garland Avenue. Trackage is provided for 80 cars. A brick building which fronts the carhouse furnishes accommodations for the officers and the trainmen. The cashier's headquarters and rooms for checking the runs are on the ground floor. On the second floor are commodious lockers and the shower baths.

REPORT OF THE COMMITTEE ON SAFETY LEAGUES*

BY GEORGE CARSON, CHAIRMAN; R. E. M'DOUGALL AND W. E. WEH

In the interests of the safety league work, soon after the appointment of the committee, the chairman sent to the claim agents of the member companies a circular letter.

The replies show that there has been a great awakening in regard to the value and importance of safety work and a correspondingly increased appreciation of the results thereof. If the expenditures for claims are to be lessened, there must be a reduction of accidents; accidents can be materially reduced in number and severity through practical and systematic efforts and methods along the line of prevention.

EMPLOYEES

In carrying on campaigns for the prevention of accidents, many companies have inaugurated special methods of training their employees with the object of prevention in view. Some of these are cited below:

Great care in selection of trainmen and through physical examinations with proper tests as to hearing and sight.

Schools of instruction for trainmen with competent instructors and follow-up system of inspection work of new men until such time as they become thoroughly proficient; in some cases, return of the trainmen to the school of instruction for further instruction if found necessary.

Systematic efforts to retain trainmen in the service through square dealing with them; establishment of benefit associations and pensions.

Lectures to trainmen by the claim agent and operating officials on prevention of accidents; lectures often accompanied by stereopticon views, showing various types of actual accidents, also dangerous points on the lines—bad curves, bad thoroughfares, garage entrances, blind alleys, block lights, etc.

Increase in wages when trainman's record is free from accidents for a six months' period, and discharge from the service if the trainman fails to deserve an increase in twelve months.

"Absolute stop" signs posted at dangerous points, such as fire stations, public schools, railroad crossings, etc.

Printed safety bulletins to employees issued monthly.

Examination and instruction of new men by claim agent before they are permitted to go to work.

Close communication between departments in relation to cause and prevention of accidents.

Organization of safety committees.

Large "safety" pennants displayed in trainmen's quarters, company's barns, shops and other buildings.

Reasonable inquiries by inspectors and others in charge of trainmen into their manner and habits of living, their observance of the laws of health and decency.

Office accident charts known as "bogies," with curves showing daily all classes of accidents occurring; curves showing daily and cumulative accidents; curves showing cumulative and daily accident expense.

Carhouse competitive safety charts, known as "bogies." These charts show daily and cumulative curves of accidents in each carhouse numerically. They are continually watched by trainmen and cause a friendly rivalry between the trainmen of the various lines. As far as the committee knows, the only company using these charts at this time is the Puget Sound Traction, Light & Power Company of Seattle.

Folding or sliding gates on both ends of cars undoubtedly decrease step accidents, particularly after the trainmen have become accustomed to their use. Theoretically, apart from defects in car steps and landings, gates should eliminate all liability step accidents and will do so, the committee believes, if the gates are handled by trainmen according to rules.

Stopping of cars on the "near side" of the street, many companies believe, will prevent a number of collisions.

THE PUBLIC

Concise and intelligent advertising conspicuously printed in the public press calling attention to reasonable and proper methods of avoiding accidents, with cuts illustrating common types of accidents.

Safety cards posted in public and parochial schools.

Safety lectures in public and other schools, women's and other clubs, universities, business colleges, etc.

Desk blotters distributed in offices and mailed with bills to company's customers with warnings against accidents printed thereon.

Letters to vehicle owners on avoidance of accidents, also cuts illustrating various kinds of collisions posted in barns of vehicle owners.

Warnings against accidents printed on back of transfers.

Cuts on cards posted in cars showing right way to alight from car.

The Philadelphia Rapid Transit Company has distributed a booklet calling attention to danger of accidents to children from cars and other vehicles.

On the New Haven lines motormen who passed directly in front of schools were directed, during a certain period, to report the number of children who apparently crossed the tracks carelessly. They then notified the schools that a reward would be furnished to the school children who had made the best improvement the next time the motermen observed the children for the same length of time. After it was decided what school had made the most improvement, the company gave the children of that school a picnic, sending them to a shore resort in five special cars and there furnishing them with peanuts and rides on the flying horses, etc.

The Boston Elevated Railway offered to pupils of secondary schools cash prizes for best verses in rhyme in relation to care in avoiding accidents. The composition awarded the first prize was printed and distributed among the pupils of all schools in the metropolitan district.

SAFETY COMMITTEE WORK

The committee believes that, for the purpose of schooling employees in the prevention of accidents, while benefit will be derived from all methods referred to, a systematic organization of safety committees is the most effective.

Probably no more striking illustration of the effect of systematic safety committee work is shown than in the results of such efforts on the Pennsylvania lines. The American Museum of Safety in 1910 presented to the Pennsylvania Railroad a medal signifying that that company had done more for the protection of its employees than any other company during that year. The reduction in the number of accidents was brought about through committees of safety, the various committees being appointed to work to which members of the committee were peculiarly fitted, as, for instance, a road and yard committee was composed of a passenger engineman, a freight conductor, an inspector of car repairs, a telegraph operator and a laborer. Another excellent point which brought constantly to the work of the safety committee new energy and enthusiasm was a change from time to time in the personnel of the various committees.

It is interesting to note that a number of companies have formed safety organizations. An excellent departure observed is the employment of outside experts who visit the carhouses, examine the track, rolling stock, indeed all parts of the service, and suggest methods of avoiding accidents.

It is necessary that the claim agent or the one who is chairman of the safety committees should keep up the interest among the men, call regular meetings and inspire the men with enthusiasm, so that the committees shall not become merely perfunctory and useless organizations, but rather develop into live, active, vigilant bodies of men bent on improving and bettering the service and avoiding accidents.

*Abstract of report read before the American Electric Railway Claim Agents' Association, Chicago, Ill., Oct. 7-11, 1912.

The chairman of this committee first found the school authorities rather reluctant and apparently very skeptical about the results of instruction of pupils.

However, after one semester the value of common sense instruction in regard to the prevention of accidents became so manifest that it has become an established feature of the school work. The instruction in the schools not only reaches the pupils, but through the discussions in the families resulting from the lectures in the school, much of the caution and advice is disseminated among the older people. Your committee believes that safety lectures are the best means of educating the public to avoid accidents.

Accidents embitter the public. The company which has the fewest accidents naturally has the least to adjust and will in the long run find that it has gained the confidence of the public. Safety work, however, is like advertising—to make it a success one must keep everlastingly at it.

While the slogan should be, "We shall not have accidents," yet all accidents cannot be prevented. Inattention, carelessness and negligence cannot always be avoided, but by education extended to employees and the public, and by improved methods of operation and by the elimination of defective equipment accidents can be greatly reduced. The function of safety work is to reduce them to a minimum and keep them there; the progress already made in achieving this object your committee happily reports is most encouraging.

EDUCATION*

EDUCATION OF EMPLOYEES

BY JOHN J. REYNOLDS, CLAIMS ATTORNEY, BOSTON ELEVATED RAILWAY

The selection of competent instructor motormen is of the greatest importance because they are largely responsible for the early formation of the habits of the student. Much of the routine operation of a car has been said to be largely a matter of habit. If this is so, then it is plainly necessary that the learner should not be permitted to form any bad habits in handling a car, for if a bad habit is once formed, it is very difficult, if not impossible, to correct it. Do not let your instructors get in the habit of thinking that after the pupil is broken in he will run his car or train automatically, so to speak. Work is automatic only to a limited extent; it requires a mental effort every time. One cannot afford to become mechanical; brains count in the operation of a railway, always and everywhere.

Although instructors should be left as free as possible to work out their own problems within the rules of the company, they should be warned that they must not go beyond the limits which the rules fix. Great stress should be laid by the chief instructor and by the motorman instructors upon the important rules, such as spacing, speed approaching and passing standing cars, vehicles, obstructions, excavations, travelers in the highway, running through special work, track junction points, and other rules looking to the prevention of accidents.

The work of the instruction department should not end when a man is turned in to work for himself. On the contrary, each new man should be followed up daily by traveling instructors until he gives evidence that he has formed the habit of doing his work properly. In this way, any wrong tendencies may be curbed before they become a part of the new man's regular method. There is no more important phase of instruction work than this follow-up feature.

It is the narrow margin of safety observed by motormen that causes those avoidable accidents commonly attributed to human failure.

The commonest reproach against car crews, generally, which sums up nearly all the deficiencies charged against them, is that they show little or no interest in their work. In few industries do intelligence, stability, skill, zealous interest and absolute fidelity on the part of the entire force of employees count for as much as they do in street railway work, for the simple reason that these qualities tell so tremendously upon the result.

In order that our business may be conducted in an orderly way we must enforce our rules; before trying to enforce them, however, we should be sure that the men know their rules, and to carry this thought forward another step, I should like to see all roads appoint an instructor of rules and regulations, whose sole duty would be to attend to the instruction of men in the rules of the company.

A good way to sustain interest in the rules is to place from time to time in each car vestibule a printed card showing a list of some of the leading operating rules, such, for instance, as the spacing rule, the rule against throwing electric track switch under car, etc. Then require each conductor and motorman when changing ends to carry his list to the other end of the car. By doing this his mind should become impressed with the importance of those rules.

Experience teaches that car crews will try to please their superintendent when personally appealed to. Superintendents should not delegate this important work to inspectors, starters, or other officials in their division. Frequent meetings between the superintendent and the men will tend to develop personal dignity among the men. Talk about rules to them and get them fixed in their minds; talk about accidents which happen every day and their causes. Do all you can to disseminate this knowledge so that when accidents occur from causes which can be prevented the men will know all about them. Get each man to feel that he is a safety committee all by himself, delegated to prevent some one accident.

Safety committees, composed of the right men, would do a world of good to themselves and to the other men by going over with them any accident they may have had and pointing out how the accident could have been avoided. The educating influence of such work should be far-reaching. It would give the men a railroad education, so to speak, and dissipate many errors on the subject of proper operation and might serve as an initiation into co-operation. It would bring the men nearer to each other, and the superintendents nearer to them. It unites them by a bond of interest which sooner or later changes into a bond of sympathy and destroys antagonism. The men will improve in their work, because they will apply themselves to it more cheerfully. They will therefore be more careful of equipment; they will watch over the safety of passengers and others better and will have fewer accidents; and finally by their exactness, their good work and their general behavior while about the company's business, they will try to please the patrons of the road.

SAFETY EDUCATION A NEED AND AN OPPORTUNITY

BY FREDERIC S. HUGHES, SAFETY LECTURER, LOS ANGELES, CAL.

I have been going to school. I have been teaching "the young idea how to shoot" through life safely—across the busy streets and on and off your cars—and in the minds of a half million school children I am known as "the Safety Man"—no higher title existing, to my mind. From swift rides in the ambulance and hospital and home visits—where I talked with boys and girls one at a time, after the accident had happened, to visiting approximately one thousand public and parochial schools as a welcome friend to point out the way to avoid the ambulance and keep out of the hospital, is a radical record and the very memory is a constant source of joy.

How can the employee be trained to think for the unthinking public? First by interesting him, appealing to both the selfish

*Abstracts of papers read before American Electric Railway Claim Agents' Association, Chicago, Ill., Oct. 7-11, 1912.

and unselfish sides of his nature. The foundation act must be to establish his confidence in your sincerity, for he is quick to pierce the sham and suspect the sincerity of the man who prates of safety first in platitude and then deserts him to the tender mercies of an unsympathetic train dispatcher or inspector, who knows no other terms than schedule and speed and does not hesitate to inform the "safety" operative that "he must 'get there' or we will get some one who can make the speed."

One of the best means devised to correct this evil is that of safety committees, for they are constantly impressing upon the officials and inspectors and dispatchers and rank and file the importance of considering constantly this phase of the problem and of adjusting schedules accordingly.

Starting in the West—Oregon, Washington and California—this method of educating the school children was received with open arms, but the street railway officials of the East were skeptical of its welcome in the more staid and conservative school centers of the Atlantic coast. I am pleased to announce officially that this fear was unfounded—as even the management needs education in the knowledge that human nature is the same everywhere.

That wideawake company—the Public Service of New Jersey—gave me the opportunity to demonstrate this. In both northern and southern New Jersey the response was immediate and equal to the best on the Pacific Coast. In a way there was better co-operation. In seven cities already covered the work bids fair to become a permanent part of the school instruction work, and this is the aim I would offer to all your several localities.

After you have the consent of the company, get in personal touch with the school board and the superintendent of your public schools, at the same time reaching the bishop of the parochial schools of your diocese.

One important point should not be overlooked. Public Service of New Jersey wisely had this movement come from the company itself—not from the claims department or any department—and it further desired no special publicity for the corporation. I agreed to the first but balked on the last, as I believe in giving credit for a good act where it belongs.

While urging local movements with local city or state names at the beginning—such as the San Francisco Safety League, Seattle, Los Angeles, San Diego, Portland, etc., or the California Safety League and the New Jersey Safety League—as now working in those states—I believe that the larger idea, as seen in this gathering here, "For safe America," arouses a deeper and more abiding interest and enthusiasm for the cause. Why not "American" when we have the American Electric Railway Association, the American Red Cross and that excellent institution, the American Museum of Safety?

I have said little of results as you have the reports of your members last year and will hear larger things this—but I cannot pass over the excellent record of the Essex division of the Public Service Railway of New Jersey—where I labored four months and am still engaged in reaching out to the other centers of population. Following the harnessing of the schools to the safety chariot in February to June comparative records were made for the four school months before vacation. The year 1911 had been a good one from a claim department standpoint and yet there was a reduction in deaths—two having occurred in 1911 of school age while none happened in this period of 1912. Seventy-five child accidents were reduced to forty-six—a decrease in total child accidents of 38.6 per cent and a decrease in accidents to school children of 47.5 per cent.

BY IRA P. NEWEL, PORTLAND RAILWAY, LIGHT & POWER COMPANY

We who spend our time in claim work often hear people say: "As long as there are railroads, there will be accidents." Now I do not believe that this is true. History shows us that many great things have been accomplished by the fellow who "held on" amid the cry of the pessimist "there's no use," and we must hold on. What have we to gain by letting go? Certainly nothing to gain but much to lose. To let go would mean going back into the old rut in climbing out of which we have spent so much time and hard work.

In almost every accident report which I read I can see how, through the exercise of common sense on the part of some one, that accident could have been avoided. Now that is what the public needs; education that will teach them to use common sense and to think.

For the past three years, in the city of Portland, we have carried on a campaign among the school children with remarkable success and we intend to keep it up, each year presenting some new features to arouse the interest of the children.

Of course all homes do not have children and there are many people living in hotels and rooming houses who are sadly in need of this kind of education. All of these people ride in street cars and proper advertising in the cars will do much toward educating them along this line. In the Portland street cars we have a sign which reads: "There's a *Reason* for *Everything Except* a Wowan Getting off a Car *Backwards;* That's *Foolish.*" This we copied from Tacoma, Wash. Just opposite this is another card, in colors, showing the right and wrong way of alighting from a street car.

In the way of moving pictures we find another means by which we can depict the consequences of thoughtlessness on the part of the traveling public. This, to my mind, is the most effective way in which to reach the public, for a picture will leave an impression where words fail.

This work is not primarily to save our money for our companies but to save the lives and limbs of our citizens. I am proud to be one of the workers in this field and I feel that this movement of educating the public in the prevention of accidents is one of the greatest that our country has ever known. It means fewer cripples, fewer widows and orphans and as a result happy and more normal conditions.

Bill "Red Eye" Sawyer didn't show up till noon yesterday, thereby giving an "emergency application" to the wheels of progress. His excuse to his committee was that the hotel clerk forgot to call him, but we saw him marching in the parade cheering his head off for Woodrow Wilson. Fine parade, wasn't it, Bill?

The Public Service Commission of New York, Second District, has received a communication from Frank D. Lyon, secretary of the New York State Automobile Association, asking if the commission has any objection to the plan of indicating routes by colored bands on poles of public service corporations along automobile public highways. The commission has written Mr. Lyon that it has no objection whatever to the proposed plan, provided, however, that the colored bands are so placed that they will not interfere with the stencil markings of the pole showing ownership, as required by order of the commission.

It will be of interest to those electric railways which make a practice of improving their load factor by selling current for farm use to know that this practice is carried out to quite an extent in Germany. The *Electrical Review* for September 20 gives an account of a transformer wagon drawn by horses to any desired distributing point and there left to be coupled on to the high-tension transmission mains. The wagon contains a transformer, the frame and sides being constructed of iron. The apparatus is made accessible through suitably arranged doors. Current is led to the wagon through a bow collector which can be lowered while the wagon is being moved from place to place as required. A portable cable leads to the power-consuming apparatus and is often several hundred yards in length.

TRACK MATTERS DISCUSSED BY ENGINEERING ASSOCIATION

At the close of the joint session of the Engineering and Accountants' associations yesterday morning the Engineering Association met to consider the report of the way committee. President Ackerman said that he had received a letter from Secretary Litchfield resigning the office of secretary of the association. The letter read as follows:

"NEW YORK, Sept. 11, 1912.

"Mr. E. C. Ackerman, President,

"Dear Sir—The writer has come to the conclusion that the field of the Engineering Association has broadened to such an extent that the interests of its members would be best served by the consolidation of the office of its secretary with that of the American Asociation. The detail work has been rapidly increasing, and to continue the present policy of having as secretary an engineer actively engaged in professional work would, in my judgment, require the regular employment of paid assistants. This would, of course, involve considerable expense and, furthermore, the experience of the past year convinces me that the work could be more effectively handled in the office of the general secretary. I therefore present my resignation, to take effect upon the election of the new officers at the coming convention. Yours very truly. NORMAN LITCHFIELD, Secretary-Treasurer."

A. T. Clark, in moving the acceptance of Mr. Litchfield's resignation, referred to his work in the highest terms and expressed the regret of the association that Mr. Litchfield's many duties required him to give up that work. G. H. Kelsay, Indiana Union Traction Company, in seconding the nomination, expressed the same sentiments.

H. H. Adams then referred to the great services which Mr. Litchfield had rendered to the association and said that his associates in the organization wished to present him with a small token of their esteem and regard for the work which he had performed for the organization. He then presented to Mr. Litchfield a gold watch and chain. The watch was of Swiss manufacture with a split-second hand. On the outside of the case Mr. Litchfield's initials were engraved, and on the inside case was the following inscription: "Presented to Norman Litchfield upon his retirement as secretary and treasurer of the American Electric Railway Engineering Association."

Mr. Litchfield expressed his apreciation of these testimonials and this gift in an appropriate speech.

The association then instructed the secretary to telegraph to President McCarter its regrets at his inability to be present at the meeting through illness and expressed wishes for his recovery.

REPORT ON WAY MATTERS

J. M. Larned, Pittsburgh Railways, then submitted the report of the committee on way matters. He pointed out that the recommendations made by the committee in regard to rail sections and joint plates had not yet passed to the committee on standards and would therefore be referred back to the way committee, but a full discussion and criticism was desired for the benefit of the succeeding committee.

C. A. Alden, Pennsylvania Steel Company, submitted the following remarks:

DISCUSSION BY C. A. ALDEN

"I have been requested by the chairman of the way committee to comment on the rail sections submitted, especially the guard rails. The dimensions of the groove in the guard rail can be determined theoretically in several ways, and provided the assumptions necessarily made are found in practice to exist, theory should agree with practice. The assumption on which the proposed section is designed will rarely exist. Ordinarily cars run upon any system of widely different wheelbases, instead of but one, as assumed, and wheel flanges are produced by wear both of different sizes and shapes from that of the system proposed.

"In the report of the Proceedings for 1909, Vol. I, pages 72 to 79, inclusive, will be found a discussion of the gages and guard-rail grooves on curves unnecessary to repeat here but clearly showing that for the conditions met with in service it is theoretically necessary to widen the gage on curves and also the width of guard-rail grooves, and this necessity is also proved by practice.

"All these conditions were taken into consideration by the speaker in designing the groove in Pennsylvania Steel Company section No. 283. This rail is still believed to be the correct dimensions for A. E. R. A. standard flanges and to require the minimum amount of planing for conditions as they exist. The speaker therefore believes that the width of groove given as 1 9-16-in. should be increased to 1 11-16-in., the angle given as 65 deg. should be increased to 70 deg., and the gage-side angle given as 3 deg. 22 min. 38 sec. to 10 deg.

"In regard to the dimensions of the guard necessary to resist the strains of guiding wheels around the curve, resisting abrasion and providing material so that groove may be enlarged when required by conditions, the Pennsylvania Steel Company's first guard rail, designed some twenty years ago, had a thickness of bottom of groove of 5/8 in. and a thickness of guard of 3/4 in. Progressing through various sections these dimensions were increased as experience proved their necessity until the last section designed by them had a thickness at bottom of groove of 29/32-in. and a thickness of guard of 1¼-in. The proposed section has a thickness at bottom of groove of about 11/16-in. and a thickness of guard of less than 1-in. I think our experience has proved these dimensions to be insufficient and that they should be increased to at least 7/8 in. and 1¼ in., respectively.

"It might be well at this time to point to the fact that there are in existence to-day guard rails rolled by the Pennsylvania Steel Company, its section 151-283, and a nearly identical section by the Lorain Steel Company, its section 150-441, both admirably suited to the A. E. R. A. standard wheel flanges. Probably arrangements could be made to bring these sections into exact agreement as to the shape of the tread to meet the views of your committee and thus provide a guard rail suiting A. E. R. A. conditions without adding other rail sections to the lengthening list. Suitable 'mechanical' joints for the sections are also in existence, at least as good as those proposed, as well as patented joints, and by taking these as a basis and designing a straight track rail therefrom a really effective standard might be very shortly evolved and a practical advance made toward a standard which would be used in practice instead of simply being illustrated in the Proceedings of the association.

"This procedure would enable the tram of the rail to be strengthened at its weakest point. The necessity for this was pointed out at the 1911 convention. It would also involve the abandonment of the tapered web, which at best is pure theory, and should be tested in practice before embodiment as a standard or recommended practice of the association.

"The base of the rail would be reduced to 6 in. instead of 6½ in., but this has been ample for service and removes some serious rolling difficulties. The top of the head can be shaped to suit the views of the users of the rails, who are better fitted to pass on this question than the manufacturer. The method proposed by the committee of evolving a 7-in. rail from a 9-in. rail seems logical, and I can suggest no change in it."

ADD DISCUSSION BY R. C. CRAM

R. C. Cram, way department, Brooklyn Rapid Transit Company, then submitted the following written discussion:

"I have examined with much interest the advance report of this year's committee on way matters. While I am in accord with the general substance of the report, I beg to call attention to the design of the 7-in. grooved girder rail, with particular reference to the width of the base, which is set at 5½ in.

"I believe that this width is too narrow, for several reasons. First, as it is desirable to avoid the use of tie plates, the base should be as wide as possible so as to provide as much bearing area as can be conveniently rolled. This was determined by last year's committee in the case of the 9-in. grooved girder section to be 6½ in. Another reason for added width is that spiking on the tram side is made easier and the spikes may be driven more nearly vertical.

"I believe that the width of base in the 7-in. section should be made the same as that of the 9-in. section, and while the increase in width adds perhaps about 8½ lb. to the weight, it certainly adds to the value of the section more than the amount represented by the extra cost. There is also the betterment to be obtained in rolling by having just so much more metal in the base, thus more nearly balancing the amount in the head, which has more than an equitable proportion of metal.

"Further, most of the new 7-in. foreign rail sections have a 7-in. base, eight recent foreign sections being 7 in. high with 7-in. base, two being 7 in. high with a 6½-in. base, and five recent American sections have a 6-in. base, all of which gives further support to my contention for a wider base. In connection with the design of foreign rail sections, there is an excellent article in the *Engineering News,* Volume 67, No. 21, for May 23, 1912, in which it is stated that the widest possible base should be obtained.

"If our foreign brethren are willing to go to the extra cost which our own makers say is entailed by a 7-in. base, we can well afford to have the widest possible base obtainable in this country without added cost, which is limited at present to 6½ in. by our manufacturers.

"It is also pointed out that in the analysis of rail section given in last year's report the advantages of the 'widest base possible to roll' are emphasized and the width of base is given as an important factor. Under the head of distribution of loads on foundation, width of base is stated to be of 'greatest importance,' and under the head of weight it is stated that the base was designed for 'best bearing and spiking accommodations.'

"If those arguments were sound for a 9-in. rail they would seem to be sound for a 7-in. rail, and I maintain that any reduction of the width of base from less than 6½ in., the largest economical maximum, is contrary to the principles laid down in the committee's own analysis, and also against good practice as evidenced by practically all recent designs.

"Since most engineers are agreed that 7 in. is coming to be the generally adopted height of rail for city street work, it will be well to consider very carefully before we take any backward step in the design of a section which is becoming more and more important, and I am of the opinion that the adoption of a base 5½ in. in width would be a most unfortunate step backward.

"I am further advised that your committee was not in entire agreement on the 5½-in. base, so I feel that I am certainly not alone in my contentions."

DISCUSSION BY VICTOR ANGERER

Victor Angerer, William Wharton, Jr., & Company, had submitted the following letter to the committee. This was read as a part of the discussion of the subject.

"With reference to your request for a criticism and suggestions regarding the proposed standard girder-grooved and guard rails, as presented in the way committee report, one is loath to venture any criticism upon the results of so much thought and such thorough investigation as your committee has brought to the subject. Furthermore, I believe that the sections as proposed would cover the requirements of such a large number of railway companies, and standard sections of this character are such a crying need, provided they do not simply remain standard on paper but are adopted for actual general use by the majority of the railway companies, that I would rather see no further improvement attempted than have its consideration delay their final adoption. However, as you request it, I may make a few comments:

"The general outline and dimensions of the various parts of the new girder section for straight track were so thoroughly discussed last year that I can add nothing, except that I would again like to call attention, as I did last year, to the rather thin metal in the tram part. Since last year's meeting at Atlantic City I have had a number of plaster casts taken of rails of a similar top contour that have been in service for some time to show the wear lines produced partly by the 'nosing' of cars or bad wheel gage or track gage and partly by the vehicular traffic. [A sketch was submitted to show these worn contours.] The wheel flanges of the cars using this track were 11/16 in. deep and rather narrow. Wheel flanges of the association standard 'A' ⅞ in. deep and correspondingly thicker would, I should say, deepen these wear lines, and making the correction, I have developed a wear line where the thread at or near the gage line is worn down ⅜ in. This shows that the thickness of metal that would then be left at the thinnest part of the tram, where it is hollowed out underneath the 37 edge slope by the radius of 123/64 in. would be on 3/16 in., and I believe that long before the wear reached that point the heavy vehicular traffic coming on top of the extreme end of the tram part would bend the tram down and possibly break it off.

"I am aware that most similar sections which are at present rolled are also similarly hollowed out and do not give any more metal further down at that point, and I do not know that any such rails have been traveled over long enough by cars with ⅞-in. flanges either to prove or disprove my argument; but it seems to me that with a rail designed with such care for great stability, in the proportioning of the web and base, and long life, in the proportioning of the head, this feature might be worthy of some consideration, and some metal be added underneath the tram where it is now hollowed out.

"I also believe that the addition of some metal underneath the deepest part of the tram, at the fishing line, would be desirable, for the purpose of strength, possibly easier rolling (if the metal further along the tram is thickened), and principally to avoid the necessity of making the groove of the guard rail shallower than the straight track rail, as is now proposed, for the reason which I will explain later. [A sketch representing the author's idea as to how the metal might be added was included.]

"The 7-in. girder grooved section seems to me well proportioned in comparison with the 9-in. section, but the same remarks in regard to the thickness of the tram, of course, apply.

"The girder guard rails certainly should fish perfectly with their connecting grooved girder rail, and the principle of making the girder guard sections in all essentials affecting this exactly identical with the grooved girder rails is, in my opinion, undoubtedly correct. The groove of this girder guard rail, in my opinion, is correctly designed and of proper dimensions as to width to cover the practical requirements. The rise of the guard of ⅜ in. above the head is not only accepted practice, but it is necessary for some of the small flanged wheels which are still used in many cities. For the ⅝-in. deep flange, for instance, a guard less than ⅜ in. would hardly be safe on sharp curves.

"The only thing that I might suggest again is that the guard is not thick enough. On the same lines as in my above remarks on the thickness of the tram of the straight-track section, I have made up a sketch showing an extreme

composite wear line of both inside and outside rails, obtained from a number of worn sections, with 7/8-in. flanges. [This sketch accompanied the letter.] This shows that again, if a rail is allowed to wear as much as some have been allowed to wear, the guard, as designed, would get extremely thin and undoubtedly bend or break before that point was reached.

"It should be further considered that in many cities we have to contend with the fact that interurban cars, with M. C. B. flanges, are run over the city tracks and around the curves in the city streets, and that in consequence we have to provide for a combination traffic of ordinary flanges and M. C. B. flanges. It would hardly appear desirable on the part of the railway company in such cases to go to the special sections of girder guard rails that are rolled for use with M. C. B. flanges. The usual method to provide for occasional interurban cars mixed in with the city cars is to widen the groove of the regular guard rail by planing. Planing has also to be resorted to with the association standard flanges when the curves get below 40-ft. radius or the wheelbases about 6 ft. In such cases, therefore, the initial thickness of the guard would be further reduced, which adds another point to the desirability of making the guard in the standard section thicker from the start. It is also the provision for the M. C. B. flanges that we run up against, in connection with the city flanges, that made me say that it is undesirable to make the groove in the girder guard rail only 1¼ in. deep, and the same depth as in the straight track rail, i. e., 1⅜ in., should be maintained and the metal added underneath at the fishing section.

"If there is objection to this added metal, on account of the added weight, it seems to me that the stem might be thinned slightly, or even the base narrowed slightly, to compensate for it, without detracting from the section.

"Not having anything to do with the rolling of rails for quite a number of years, I am not qualified to say anything on the question of any difficulty that these sections might present to the mill over the present sections in use, but from the standpoint of the special work manufacturer I see no objections to these sections, except that they would be somewhat more difficult to curve on account of the wider base. The tapered web might also give some little trouble, but just how much that would amount to cannot very well be foretold."

DISCUSSION OF GEORGE L. WILSON

George L. Wilson, engineer maintenance of way Twin City Rapid Transit Company, submitted the following written discussion:

"Having read the specifications for open-hearth girder and high T-rails, the writer congratulates the committee upon its work in simplifying the specifications by the omission of duplicate and superfluous provisions, also on the improved clearness of statement.

"It appears that the revision will require as careful mill work by the manufacturers and in some cases more so, which will be of benefit to the purchaser. The provisions in regard to the tests and rejections appear clear and definite enough for both the manufacturer and the inspector to understand what is called for.

"The change in chemical composition by including provisions for high carbon should be adopted by all engineers to obtain a better wearing rail for use under the conditions which exist in paved streets. It is in line with the writer's practice for the past five years. During this period, high T-rails, with a carbon composition ranging from 0.75 to 0.90 and with phosphorus not over 0.03, have been used with entirely satisfactory results. No breakages have been experienced in the paved track and the amount of corrugation developing on this high carbon rail has been practically nothing as compared with a considerable amount on rails of other composition. It is a question of whether the silicon may not well be increased with advantage to the wearing qualities of the rail. This is being tried the present year by the writer, and while the time is too short as yet for results to be shown, it is expected to continue the experiment in the future.

"The changes in regard to discard, to the branding and finishing are improvements. The increase of accuracy called for in the height of rails will be of use in keeping the rail surface of adjoining rails in the same plane. Trouble from pounding joints begins with the fact that the ends of rail at joints do not form an exact plane, while with all forms of joint fastenings it is recognized that the rails must be ground after the rails are in position, yet the more closely the abutting rails correspond the better."

OTHER DISCUSSION

President Ackerman then asked R. F. Kelker, Board of Supervising Engineers, Chicago Traction, to read a paper which he had prepared describing the use of continuous rail in Chicago. An abstract of this paper appears elsewhere in this issue.

Mr. Kelker, in continuing the subject of rail sections, said that it was impossible in his opinion to design a rail which would take care of every possible condition, and that the standard selected should be something which would be generally applicable and not fitted for special cases. He approved the width of base recommended by the committee.

M. J. French, Utica & Mohawk Valley Railway, discussed the proposed rail section, which he approved. Mr. Schreiber also spoke in favor of the sections.

In closing the discussion, Mr. Larned expressed the thanks of the association and of the way committee for the suggestions received on the subject of rail section. He did not think it would be advisable to attempt in convention to decide the question of width of groove in the guard or thickness of metal or other detailed dimensions. This could be done better in committee and would be taken up by next year's committee.

A vote of thanks was then extended to the committee and the meeting adjourned.

REPORT OF COMMITTEE ON TAXATION*

BY C. L. S. TINGLEY, CHAIRMAN

Pursuant to the recommendation of the committee last year data sheets covering state laws on taxation of electric railways were sent to the forty-seven members of your committee. The thirty-nine responses which your committee received show that taxes are assessed under general law in fourteen states, under special laws in twenty-one states, and under both general and special laws in four states; by state boards in twenty-one states, by local assessors in seven states and by state boards and local assessors in eleven states. They show further that gross receipts are taxed in eleven states, that net receipts are not taxed in any state, that capital stock is taxed in eight states, that bonds are taxed in four states, that other loans are taxed in three states, that tangible property is taxed in twenty-one states and that the property as a whole is taxed in seventeen states. That municipalities have power (whether exercised or not) to tax gross receipts in twelve states, to tax net receipts in five states, to tax capital stock in two states, to tax bonds in one state, to tax loans in one state, to tax tangible property in seventeen states, to tax the property as a whole in seven states, to require paving in thirty-seven states, to levy car licenses in twenty states, to levy pole licenses in sixteen states, to require street sweeping in eleven states, and to levy bridge licenses or taxes in fourteen states, and that in six states they have power to impose other special burdens or payments.

In addition to the above there was sent to each member of the committee a form letter to be signed by him and sent with

*Abstract of report read before American Electric Railway Association, Chicago, Oct. 7-11, 1912.

a data sheet to each company in his state to ascertain the municipal practice under the law. To this letter 191 responses have been received and have been tabulated.

Taxation in some form is as old as in the history of man, and one would naturally suppose that it would have been reduced to something like an exact science ere this, but it is very apparent that legislative bodies all over the world are seizing upon subjects for taxation which are the most easily reached irrespective of the incidents thereof. In a well considered paper on the incidence of taxation by A. C. Pleydell, secretary of the New York Tax Reform Association, presented before the First National Conference on State and Local Taxation, the following language is used: "With the increased complexity of our social organization an increased amount of taxes are paid to the collectors by persons who immediately add them to the price of goods or services. These taxes may for convenience be spoken of as shifting directly. In this class are all the various taxes on manufacturing and business that add to fixed charges and must be collected from customers or the manufacturer or merchant cannot continue in business." It is quite apparent that these remarks cannot apply to the business of electric railways, more particularly those operating wholly in cities, as they cannot add the tax to the rate, and the tax must therefore either be borne by the stockholder or, if shifted to the consumer, this is done in decreased efficiency in service and not in direct payment."

In a paper read before the same conference on the taxation of public service corporations by Prof. Adam Shortt of Queens University, Kingston, Ont., and a member of the Tax Commission of the Province of Ontario, the following interesting language is used: "Under modern conditions the public is ever more insistent on regulating the rates and charges of these corporations and otherwise closely supervising their service and their obligations to the community. This public regulation naturally restricts within very definite limits the opportunities of the corporation to augment income or even to maintain it. If therefore the public insists upon having cheap rates it must in all fairness correspondingly moderate the taxation of the corporations, for regulating rates is levying taxes in kind. After a careful survey of the various aspects of the subject and a comparison of views with representatives of tax gatherers and tax payers, I have been led to believe that a tax of 3 per cent on gross income is a sufficiently high tax for a railway, with not more than 2 per cent for other corporations. Lower rates, however, should be provided for exceptional cases where there were obviously few or no net profits, but as already indicated the absence of net income is no valid argument against a certain minimum of taxes."

Before the same conference Prof. Carl C. Plehn of the University of California presented a paper on the taxation of public utilities corporations. Prof. Plehn says, "The determination of the rate of taxation which should be applied to the gross earnings of different classes of corporations is not so difficult as might at first thought appear. We have a fairly accurate idea of what constitutes a just tax on property. In the United States at large the average for real estate, the only class of property fully taxed, is not far from 1 per cent on the full market value of the property. For purposes of illustration we may assume that 1 per cent on property is a fair rate with which to compare taxes levied on some other basis. Should someone else decide for his own part that some other rate is fair he can easily raise or lower the rates at which we may arrive in proportion as is 'fair rate property' higher or lower than 1 per cent."

Your committee recommends that the follow-up work be continued so that the records in the association headquarters may be as complete as possible, and that the secretary be kept advised from time to time as to any changes in either the law or the method of its administration. It suggests as the next step in this investigation that an effort be made to ascertain the percentage of gross receipts paid in taxes of all kinds.

EDUCATION OF EMPLOYEES*

BY JAMES R. PRATT, ASSISTANT GENERAL MANAGER UNITED RAILWAYS & ELECTRIC COMPANY OF BALTIMORE.

In the education of employees, talks and bulletins upon various subjects pertaining to the duties of the employees are all useful and are the means of accomplishing excellent results, but the man who is directly in charge of the men, the man who is responsible for their conduct, the man whose duty it is to see that each and every employee understands his duties, is the one who can accomplish more than all other combined efforts.

This duty usually falls to the division or line superintendent, and he is the man who knows his line or division from A to Z. He should know every man under him and know his weak and strong points. When he finds a man has failed in some particular case, whether it be an act of omission or commission, he should immediately take this man, not in the presence of others but in his private room, and point out to him the mistake which he has made and show him what his mistakes may mean to the railway company, the traveling public and himself, and point out to him that by following the company's instructions, by exercising discretion, precaution and sound judgment, accidents and controversies may be avoided. There is nothing like the personal touch. Here the employee is alone with his superior and is not distracted by fellow employees and "every shot goes home."

If I were asked to give the three most valuable qualifications which a competent motorman or conductor should possess, in addition to physical strength, I should name three things: (1) common sense; (2) a cool head; (3) quick judgment. And I am inclined to think that quick judgment is most important.

The little breach of discipline of to-day or failure to report an accident, however slight, if not summarily acted upon, may pave the way for the expensive litigation of to-morrow. The division or line superintendent can perform valuable service in this respect by being constantly on the alert in noticing violations of rules by operating employees and having them corrected. Failure on the part of an agent to report to his superior officer a violation of rules not only deprives the company of an opportunity to correct a fault or to remedy an abuse, but if the guilty or thoughtless employee is cognizant of his superior officer's knowledge of his failure in his duty and he is not corrected, he treats the matter lightly and considers that he possesses a license for a repetition of the offense.

The superintendent is the man who will make a good, bad or indifferent man out of an employee. He must take pains in trying to impart to the new conductor the knowledge which he possesses, and he should be sure that the new employee understands the instructions which are being given to him. The superintendent should not become peevish if the conductor does not absorb knowledge as quickly as he thinks he should, and should bear in mind that he has not only perhaps had many years of experience in a position of authority but has also doubtless sometime in his career occupied a subordinate position. The superintendent should not keep far away from his men; he should be in personal contact with them; he should have their confidence and should try to encourage them in their work. Every man should feel free to go to his superintendent, not only for instructions but in any matter in which he may be in doubt, and should feel free to suggest anything which may make for the betterment of the service.

In addition to the rules and regulations of the company, every transportation employee should be familiar with the substance of municipal ordinances governing operation of a street railway system and should be able to answer questions when called upon as to any particular regulation. The city ordinances should be printed in large type, framed and hung in the employees' rooms at the various carhouses.

*Abstract of paper read before the American Electric Railway Claim Agents' Association, Chicago, Ill., Oct. 7-11, 1912.

THE MILWAUKEE FARE CASE*

BY R. B. STEARNS, VICE-PRESIDENT THE MILWAUKEE ELECTRIC RAILWAY & LIGHT COMPANY

The long-standing application of the city of Milwaukee for a reduction in the rate of fare on the city lines of The Milwaukee Electric Railway & Light Company resulted in a decision by the Railroad Commission of Wisconsin in August this year which is of more than passing interest to those engaged in the street railway business. The high standing of the Railroad Commission of Wisconsin and the original methods which it has adopted in solving economic problems affecting the railroad and other public utility business lend added interest to its deliberations and opinion in this case. The decision of the commission in this case should assist materially in dissipating agitation for 3-cent fares.

It may be stated early in this discussion that The Milwaukee Electric Railway & Light Company has endeavored to ascertain through judicial review whether the commission has authority to modify the rates of fare provided for in franchises antedating the enactment of the law creating the commission and defining its powers. Until this question is determined the company does not recognize that the Railroad Commission has authority to alter the rate of street railway fares provided for in its franchises granted by the city of Milwaukee, under which the company operates. It does not at the present time question the commission's right to extend the limits of the city fares since the commission has authority to order joint rates between carriers.

The assumption by the commission of authority to lower the city rates of fare provided for in the franchise of 1900 arises in part from the commission's interpretation of the so-called Manitowoc case, decided by the Supreme Court of Wisconsin. An examination of this case, however, does not indicate that it has a direct hearing in the present instance, and in the commission's opinion, argument of company's counsel was passed over, with relatively little comment, and no reference was made to the supplementary opinion of Judge Marshall, contained in the decision of the Supreme Court in the case, "Calumet Service Company vs. City of Chilton," wherein the court endeavored to correct certain looseness of phraseology that had been carried into its decisions for a number of years past.

The court has not been careful in distinguishing between a corporate franchise or the right to be a corporation and a franchise granted by a municipality, covering the right to exercise privileges, and which the court in its last opinion intimates is in the nature of property.

Members of the Wisconsin bar differ as to the application and meaning of the provisions contained in Section 1, Article XI, of the constitution of the state, relating to the formation of corporations, which provides: "All general laws or special acts, enacted under the provisions of this section may be altered or repealed by the Legislature at any time after their passage." Upon the application of this provision to the case at issue depends the validity of the order of the Railroad Commission of Wisconsin.

In 1896 the city of Milwaukee passed an ordinance reducing the then rate of fare of 5 cents per passenger to 4 cents. The enforcement of this ordinance was permanently enjoined after an exhaustive investigation of facts by Judge Seaman of the United States Circuit Court.

Following the enactment of the law creating the Railroad Commission of Wisconsin in 1905, the city of Milwaukee brought an action to reduce the rate of city fare to 3 cents. In connection with this application, and the requirement of the laws of the state relating to the taxation of street railway companies, the joint engineering staff of the Wisconsin Tax Commission and the Railroad Commission of Wisconsin made a valuation of the physical property of The Milwaukee Electric Railway & Light Company, which has had an important bearing in the present case. At the time of this valuation the company, relying on its franchise rights, endeavored to keep the valuation low, that taxes might not be unduly increased, but subsequently, at the hearing before the commission, urged higher valuations that the earning value of the property might not be recorded at too low a figure.

At the present time the order of the commission is stayed by a temporary injunction, which requires, however, the sale of twenty-five tickets, with a coupon good, in case of dissolution of the injunction, in exchange for a ride, for $1, and twelve tickets with a similar coupon for 50 cents.

Milwaukee, not unlike many other cities, has its street railway lines radiating from a central district in all directions, reaching into the suburbs, to which point it has always been necessary to charge two fares. Following the application by the city of Milwaukee for a reduction in rate of city fare, applications were made by outlying suburbs for an extension of the city fare limits to these points. In view of the problems presented, the railroad commission reserved decision in the matter of the suburban fares until its investigations into the reasonableness of the city fare could be completed.

The business of The Milwaukee Electric Railway & Light Company consists of three classes, viz.: (a) Street railway within the city limits of Milwaukee, (b) electric light and power business within the city of Milwaukee, and (c) steam-heating business in the city of Milwaukee.

The street railway business consists of three parts, viz.: (a-1) Urban service proper, (a-2) city component of suburban service, and (a-3) city component of interurban business.

The generating stations of The Milwaukee Electric Railway & Light Company supply power, not only for the operation of the city lines and the electric light, power and steam-heating business in the city of Milwaukee, but also generate power for the operation of the suburban and interurban railway lines and electric energy for the supply of the suburban electric light and power distribution systems. Thus it appears that the generating plants for all these classes of business are in a large measure common, and this statement is also true of the electric distribution system.

When determining the essential facts looking toward the solution of the reasonableness of city and suburban street railway fares, the difficulty of ascertaining the value of the property used and useful in the city street railway business only is apparent. The work of the statistical staff of the commission in making the apportionment of investment and operating expenses is an excellent example of scientific accounting, which has no precedent so far as the writer is aware.

The earning value of the property, as of Jan. 1, 1911, was placed at "about $10,300,000," and the rate of return and the estimate of cost of service during the calendar year 1911 were based on this value. This earning value, made up by adding going cost to present (depreciated) value of physical property, does not differ greatly from the reproduction value new of physical property, including non-operating property.

The present value of the physical property devoted to railway uses was estimated as being 74.22 per cent of reproduction value new.

OVERHEAD CHARGES

An important element in the valuation is the allowance for overhead charges for the purpose of covering expenditures on account of engineering and superintendence, organization and legal expenses, interest during construction and contingencies. It has been the practice of the Railroad Commission of Wisconsin in many of its previous decisions to make an allowance of 12 per cent to cover these factors. While the company conceded that an allowance of 12 per cent might be reasonable for a small and medium sized property, if the inventory were accurately taken, and the unit prices

*Abstract of a paper read before the American Electric Railway Association, Chicago, Oct. 7-11, 1912.

properly selected, it was urged, hoped and fully expected that larger allowances would be made in this instance.

The practice of public service commissions of other states in making larger allowances was well known, and the company relied upon this, and actual data which it presented, in its belief that 22 per cent was reasonable.

However, the subject of overhead allowances is intimately associated with the methods under which the property was constructed, the basis of determining earning value and methods of computing going cost, and criticism should not be attempted except with full knowledge of all the other factors.

The commission in its justification for the allowance f 4 per cent for engineering, 2 per cent for organization and legal expense, 3 per cent for interest during construction, and 3 per cent for contingencies, states that "in the conflicting estimates of what should be proper overhead additions, confusion has evidently arisen as to the purpose of the appraisal. If the point of view is one of reproducing a hypothetical or identical plant, the overhead cost is concededly greater than if the appraisal is one of reproducing or estimating the company's cost or sacrifice in building up the property."

The allowance of 12 per cent for overhead charges of the nature just defined calls attention to the necessity of economy in such expenditures and the probable future difficulty of securing recognition in valuations of relatively larger amounts expended for engineering fees and general contractor's commissions.

INVESTMENT CHARGES

In the matter of investment charges, the commission computed the composite life of the depreciable property at 16.70 to 16.93 years, depending upon the rate of interest allowed on accumulations of depreciation reserve.

This results in an annual charge of 4.89 per cent on the total value now of the physical property without interest on the depreciation fund accumulations.

RATE OF RETURN

The commission, after discussing the risks of the business and the annual cost of money as represented by interest of 5 per cent to 6 per cent and the profits of management of 1½ per cent to 2 per cent, concluded that a rate of return of 7½ per cent upon the capital invested was not unreasonable.

It is recognized by the courts that what constitutes a fair rate of return may not be fixed by a general rule, but is largely a question of the particular case, and that it very largely depended upon the character of the enterprise.

The company argued against limiting the rate of return on the ground that it should be rewarded for efficient management and that a much higher rate of return should be allowed in the present instance by reason of the fact that the rate of fare was lower than in most cities of the same or larger size and enjoying no better transportation facilities. The London sliding scale of gas rates, permitting increasing rates of return, with reduced unit selling prices, was suggested, as indicating the soundness of this principle in public utility economics.

ALLOWANCE FOR DEPRECIATION

The determination of the annual allowance for depreciation is dependent upon the life of the element affected. The life of the element affects a rate case in two ways, viz.: (a) in that the value of the depreciated property may be larger or smaller as the lives of the elements may be greater or less, and (b) in that the annual allowance for depreciation may be small or large as the lives of the elements may be greater or less.

The meagerness of actual data concerning the life history of elements making up a railway property presents a serious aspect from the point of view of the utilities.

The lives of cars, motors, power plant and substation equipment, buildings, track and overhead, are assumed in accordance with the individual judgment of the engineer or other person making the estimate. We have no reliable mortality tables for public utility property, and it is far from pleasant to have legislative bodies tinkering with our tariffs with some of the elements affecting their conclusions in their present chaotic condition.

SEGREGATION OF RESULTS BY LINES

The valuation of the commission was so compiled as to make possible the segregation of tangible valuation by lines. The localization of earnings, car miles, car hours and the number of revenue transfer and total passengers, by separate lines, was made possible by the company's accounting practice. With revenues definitely known, and the cost of operation, depreciation and return upon the investment determined, it was possible to approximate the earnings of each separate line, and with the information disclosed by the passenger counts, the length of haul of the average passenger, the approximate determination of how far the company's business can be profitably extended, or, in other words, the paying haul, was computed.

The actual car hauls, together with the company's estimate of the passenger haul in miles, compared with that obtained by the commission, were about as shown in Table I, published herewith:

TABLE I—TABLE OF ACTUAL CAR HAUL BY LINES

Lines	Car Haul or Length of Line, in Miles	Passenger Haul in Miles	
		Company's Estimate	Commission's Estimate
Wells-Farwell	*8.02	2.3	1.95
Fondulac-National	*9.20	3.37	2.77
Walnut-National	*8.45	3.37	2.74
Eighth-Third	*6.96	2.8	2.93
Burnham-Third	*9.01	2.8	2.93
Oakland-Delaware	*9.04	3.0	3.92
Holton-Mitchell	*7.55	2.9	3.73
Muskego-Eighth	*7.22	2.6	3.46
Clybourn-Wisconsin	3.08	2.1	2.85
Twelfth-Wisconsin	5.29	2.6	2.40
State-Wisconsin	5.08	2.0	2.39
Vliet-First	*7.12	2.7	3.13
Howell-Vliet	*9.43	2.7	3.13
North Avenue	4.58	2.7	2.90
P. S. Bldg.-St. Francis	5.00	4.9	....
Center Street	4.10	2.3	....
Thirty-fifth Street	2.92	2.4	....
Eleventh Street-Eleventh Avenue	2.92	1.7	....
Weighted average per one-half trip	4.17	2.74	....
Simple average per one-half trip	4.11	2.73	2.93

*Through lines.

Many of the company's lines are through lines, passing through the downtown district. The company obtained the results for passenger haul from traffic count, made by its conductors from twenty-four hours' observations, at each one-half mile point, for each car throughout the day. The commission obtained the information by traffic counts, made by inspectors, located at specified points on the lines, from which data it was possible by integration to determine the approximate passenger haul.

TERMINAL AND MOVEMENT COSTS

In the calculation of the maximum economically practicable haul, the commission divided the cost into terminal and movement costs. The definition of these costs can best be quoted:

"A division was made between the cost affected by the length of haul per passenger, as distinct from costs more or less fixed in their nature which, since service is shaped to meet the public demand, must be assessed against each passenger, irrespective of his haul. These classes may be, respectively, deemed terminal and movement costs.

"Assuming that traffic is temporarily at a standstill, certain expenses would doubtless continue; among these are a portion of the costs of maintenance and repair of roadway and rolling stock, power plant, varying with the demand, depreciation due to the action of the elements and a portion of interest upon the investment. Such costs are dependent on the size or location of the entire system, and are not

affected by any possibility of increased traffic. Such expenditures have been grouped as terminal costs.

"Such costs as are affected entirely by the number of passengers hauled, and would cease if traffic were at a standstill, were grouped as movement costs. The movement cost varies under different conditions of schedule and traffic demands."

The result of this investigation showed that of the total cost of furnishing service, 57.92 per cent was terminal cost and 42.08 per cent was movement cost. Under the conditions assumed, the movement cost was 0.54 cent per passenger mile.

This analysis we regard as one of considerable interest and application in the scientific determination of proper rates f street railway fares. Those of you who are engaged in the electric light and power business have reason to be familiar with the separation of the cost of electric service into a capacity or demand and output or energy charges, and the beneficial results in the way of increased business that have come from a proper recognition in rate schedules of this fundamental principle.

The analysis of the commission in the present case points the way toward a more scientific distribution of the cost of service than has heretofore been attempted, and as such is a distinct contribution to the economics of the electric railway industry.

Upon the basis of the present average fare received by the company, made up of the use of tickets and cash, of 4.263 cents per passenger, including one transfer, the possible haul was estimated at 4.004 miles.

The average length of all city lines to the first fare point is 5.95 miles, whereas the weighted average length from the first fare point to the center of the city is 4.17 miles, as compared with the possible haul, estimated by the commission on the terminal and movement basis of 4.004 miles.

FARE AND HAUL

As stated in other discussions on this subject, while the company's receipts are from passengers primarily, its work is that of transporting cars, and the question really is not how far the company can transport passengers, but how far the company can afford to transport its cars for a given rate of fare from passengers.

It would appear from the above comparative figures for Milwaukee that the present city fare limits closely approximate the limit of possible car haul for the present rate of fare.

The ultimate solution of this vexatious problem of the adjustment of the city and suburban fare limits, as viewed by the company, was suggested to the commission by the company in the following communication:

"1. The cost of street railway service is a function of, and more or less directly proportional to, the distance passengers are carried. With the extension of the city fare zone into outlying territory, the average length of ride increases, and correspondingly the cost of carrying passengers. In any system, a limit must sooner or later be reached where the added haul is supplied at less than cost.

"2. This leads us to the conclusion that there is an economic limit beyond which passengers cannot be carried for the single city fare. The city fare limits should be determined at points that are equitable for the city as a whole, and they should be approximately symmetrical with respect to the center of traffic. Lack of symmetry opens opportunities for claims of discrimination, as between different sections of the suburban territory. Where the single fare limit has been unduly extended, it should be contracted, in the interest of symmetry.

"3. Outside of the central or city zone there should be small zones of such a length that the cost of service may be properly apportioned between the traffic originating in the various zones, and which will leave no reasonable ground for claims of discrimination between districts. The smallest practicable zone seems to be one mile, and the proper rate of fare for a ride across such zone seems to be 2 cents. The rate of fare depends in a measure on the density of traffic, assuming the same character of construction, and it might prove advisable at some date subsequent to the installation of such a system either to enlarge the outside zones or change the rate of fare.

"4. As a practical solution of some of the suburban fare problems now confronting us, and others which will arise with the extension of certain of the city lines into outlying territory, we propose to install zones of one mile in width, surrounding the majority of the present city fare limits, which are approximately three and one-half miles from Grand Avenue and West Water Street. The charge for an added ride across each of these zones would be 2 cents, and the charge for a ride in the zone would be 5 cents.

"A passenger originating in the city, and desiring to travel to a point near the outer edge of the second zone, would pay the city fare in each case or a ticket of 5 cents, 4 1-6 cents or 4 cents, and in addition thereto two zone fares of 2 cents each. The total charge for the ride would be 9 cents, 8 1-6 cents or 8 cents, depending upon the price paid for the ride in the city. On his return trip, he would indicate to the conductor that he desired to ride into the city, and the charge for the ride would be the same as on the outgoing trip. For such places as now have commutation rates, this fare scheme would be alternative to the present commutation rates. Our investigation indicates the entire practicability of collecting fares under such a system.

"5. The proposed 2-cent, one-mile zone system would apply to the suburban districts. We could further extend it from time to time along what are now interurban lines, as the density of business increased.

"6. We believe that such a system is in line with good business management and proper public policy, that it will prove popular, assist materially in the development of the outlying territory, foster the extension of the street railway system into outlying territory, and remove the barrier that apparently now exists."

Our conclusions were largely based upon a careful and detailed forecast of the population, probable riding habit and traffic conditions for each decade until 1930. The distribution of the estimated revenue passengers by one-half mile zones was extended, and in order to determine the reasonableness of the zone system the commission analyzed the income account for a period of years upon this basis, and commenting thereon, stated, in general, that while it is undoubtedly true that the relative increase in population at the outskirts of the city will increase the amount of long-haul traffic, it is probable that this increase will not keep pace with population, and that the same tendency was probably true as regards operating expenses, that some stimulation was necessary to promote the movement of population to and from the city to the outlying suburban districts, that a free interchange of suburban and urban population is not only desirable from the standpoint of gross earnings, but there seem to be sound economic and social reasons why a central zone should not be restricted to a three and one-half mile area, as such a restriction might tend to cause undue congestion of population, and that owing to the lack of other small coins than 1-cent and 5-cent pieces, distance rates could not be put into general effect, except through tickets sold in larger quantities and of which no one could avail himself unless he was in position to purchase and use several tickets.

Where such disadvantages, however, can be obviated, the commission considered the zone system not without merit.

The company suggested a suburban one-mile, 2-cent-fare zone system outside a three-and-one-half-mile central zone as a general solution of the suburban-fare problem, and did not at the time have access to the calculations made by the commission upon which it had determined that a passenger

haul of 4 miles might be remunerative. The commission viewed the case, at least in part, from the standpoint of the three applications then before it for an extension of the city fare zone, and which the three-and-one-half-mile central zone would not accommodate. The unlimited extension of the city fare zone on more profitable lines would soon lead to a very unsymmetrical distribution of city fare points, and subsequent apparent discrimination between localities of the same community.

CONCLUSIONS DRAWN

If we were asked to state the conclusions which in our opinion might properly be drawn from the opinion and the thoughts suggested thereby, we would summarize them as follows:

(a) The theory of law under which the charges for service by public utilities are regulated is in a formative state, and the legislative and judicial arms of government are searching for the correct principles. That the principles to be later accepted as correct will be affected by the voice of the people is evident to anyone following the popular trend of legislation and judicial decisions. Rate regulation began in an endeavor to eliminate unjust or unjustifiable discriminations, or to bring the rate of charge for service into line with rates of charge for similar service existing elsewhere. Slowly, in response to the oft-expressed wish of the people for lower than the prevailing rates, economic and legal theories have been developed by which the amount of capital invested and the return to which it is entitled can be measured. If the method of measuring invested capital be assumed, and be practised for a sufficient length of time, it will sooner or later receive general recognition and acceptance by economists and judicial tribunals. Thereupon the road to lower rates of charge is made smooth through the application of a rate of return on capital slightly above the amount that would result in confiscation. The tendency is apparent to-day, although the demonstrations have not as yet been numerous.

(b) The earning value or estimated amount of capital invested in the property, used and useful, as determined by regulating bodies, will probably rarely exceed, and more often be less than, the reproduction value now of the physical property. Instances where such values so determined are equal to the par value of the securities outstanding would be the exception rather than the rule. The eventual application of ordinary interest rates to such values will result in large losses to investors.

(c) Inventories and appraisals are by their nature subject to large probable errors, and the actual cost of construction will in the majority of cases exceed the appraised cost unless such be based on accurate records.

(d) With the increasing importance of physical value as the principal element of value in rate cases, there is required a new system of accounting which will show the cost and age of every element of physical property. This method of accounting, were it available to-day, would be of far greater importance in rate cases than the system of capital accounts now in use.

(e) The valuation of a public utility property for purposes of taxation may materially exceed its value for rate-making purposes, as in the present instance. That the principles of taxation are in as unsettled a condition as are those applicable to rate regulation is probably true. Since taxes are often assessed on the principle of ability to pay or the theory of comparative sacrifice, the capitalization of the amount of taxes at the current tax rate may result in values largely in excess of those determined for rate-making purposes.

(f) Profit sharing, as exemplified in the London sliding scale of gas rates, is not consistent with the principle of rate regulation by commission. The latter principle contemplates the substitution of control by the commission for the ordinary bargains or contracts of the past. The influence of this control on future methods of management is difficult to forecast, but that it will reduce the incentive for the exercise of the greatest economy is not impossible. This is one of the most serious objections to governmental control of rates.

(g) Data relating to the lives of the elements of street railway property are almost entirely lacking, and the street railway industry owes it to itself to compile statistics based upon history rather than upon opinions that will be conclusive and permit the determination of the present values of physical property and the annual allowance for depreciation and maintenance with a degree of accuracy approaching that of premiums determined for the insurance of human lives. In fact, we have come to believe that the economics of the street railway industry will remain in a more or less confused state until the same principles that reduced the hazard of the business of life insurance are applied to our industry. Criticism of legislative and regulating bodies for not making sufficient provision for the contingencies of the business will not stand until the owners and operators of utilities take practical recognition of these contingencies in their accounting.

(h) The street railway business is the most hazardous of municipal public utilities, and as such is entitled to larger rates of return on invested capital than are necessary to attract investment in the other classes of utilities. If the return be limited to 7½ per cent, only the necessity of preserving the investment already made will afford any justification for making further investments.

(i) And, finally, and with more specific reference to the Milwaukee cases, we are not prepared to state any serious criticisms of the methods used by the Wisconsin commission in applying its principles of regulation of rates, but we find difficulty in reconciling ourselves to these principles.

REPORT OF THE COMMITTEE ON TRAINING OF TRANSPORTATION EMPLOYEES*

BY H. V. BROWN, CHAIRMAN; P. C. NICKEL AND R. E. MCDOUGALL, COMMITTEE OF CLAIM AGENTS' ASSOCIATION

The work of the claim department dovetails in so closely with that of the operating department, and the question of geting results by the former depends so largely upon the manner in which the men, particularly the platform men, are trained, that it becomes absolutely essential to draw on the claim department for assistance in carrying on the work. Being constantly in touch with the accident question, the claim men naturally become experts in their peculiar line of work and are, therefore, able to direct or outline the best methods of training the employees with regard to the prevention and proper handling of accidents.

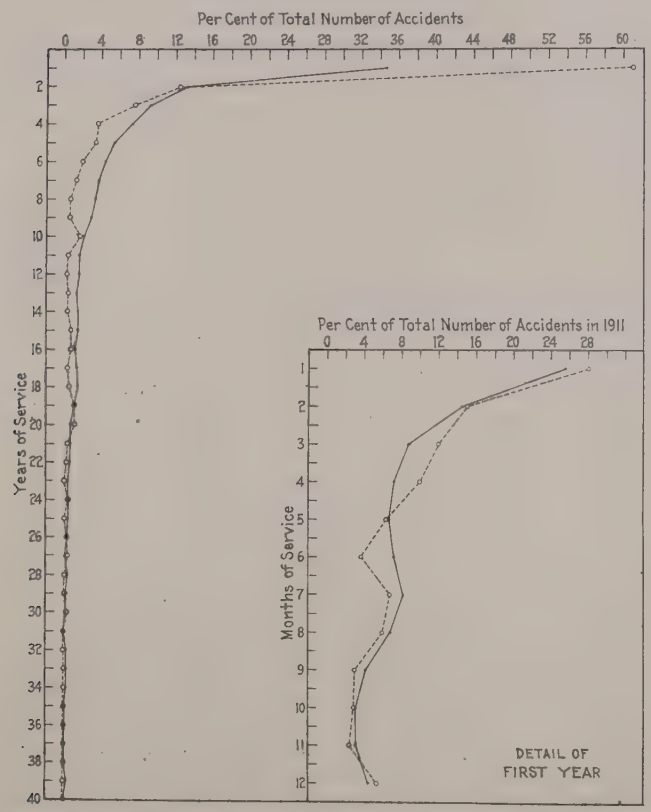
Now that the operating men are giving us an opportunity to be heard in this matter which concerns us so vitally, we must use great care not to go beyond the confines of our province, accident work. The claim agent who meddles with strictly operating matters will quickly undo, so far as his own company is concerned at least, all the good that has been accomplished.

ACCIDENT AND SERVICE RECORDS

To get at the bottom of this matter and demonstrate how much experience and training count, we have worked out a graphic chart, based on data obtained from the records of the Public Service Railway of New Jersey to show accident records of men in the service for different periods of time. These figures are not exactly true, but they are close enough for all practical purposes. To begin with, we had to ascertain what the periods of service were for the whole force, and to arrive at this it was necessary to take the records as of a certain day, while the accident records upon which the table is based

*Abstract of report read at the joint session of Claim Agents' Association and Transportation & Traffic Association, Chicago, Ill., Oct. 7-11, 1912.

were for the entire year of 1911. When we say the figures are not exactly true, we refer only to the method of arriving at the make-up of the force, which of course varies slightly throughout the year, but you can see that it would be almost an impossible task to get the true average for the entire year. Otherwise the conclusions are based on actual figures. This chart is attached hereto. One curve shows the percentage of men in the service for different periods of time, from one year to forty years, to the whole number, and the other curve shows the percentage of the whole number of accidents attributable to men of the different periods of service. In the first chart we got out we also indicated the cost, but it proved to be so consistently proportional with the number of accidents that we omitted it in the chart herewith submitted.


Per Cent of Total Number of Accidents
Years of Service
Per Cent of Total Number of Accidents in 1911
Months of Service
DETAIL OF FIRST YEAR

Relation of Length of Service and Proportion of Accidents

Note: The larger chart shows the relation during 1911 of the percentage of accidents to length of service of the employees of the Public Service Railway of New Jersey. The smaller chart shows the same relation by months for the first year men.

Some of the deductions are startling, and as the claim expenditures of the Public Service Railway Company are at least as low as the average for the larger companies, being less than 4½ per cent of the gross receipts, it is reasonable to suppose that the conditions upon which the figures were based do not differ materially among the various companies.

To begin with, we found that 34½ per cent of the men had been in the service less than one year, and that there were attributable to these men 61 per cent of all accidents for the year; 65½ per cent of the force had been in the service over one year, and there were attributable to them 39 per cent of all the accidents. Based on the Public Service Railway's expenditures for accident settlements, exclusive of the cost of maintaining the claim department, we find that the first-year men were costing the company at the rate of $202.98 per man for the year, and that the men over one year in the service were costing $66.82 per man for the year, or just about one-third as much. It is not unreasonable to suppose that the lack of training and experience of the first-year men causes proportionate waste in the operating and mechanical departments of the company.

Below is the average accident cost per man for the year 1911, based on the Public Service Railway figures, for different periods of service from one to four years:

First-year men averaged	$202.98
Second-year men averaged	135.57
Third-year men averaged	83.23
Fourth-year men averaged	47.35

Of course, these figures indicate the value of maintaining so far as possible a permanent force more clearly than they do the advantage of training, but we hold that a permanent force naturally becomes a well-trained force, if it is only from the experience gained, for, as the old adage says truly, "Experience is the best teacher."

TRAINING ON ACCIDENT MATTERS

Circular letters were sent out by your committee to the claim agents of all member companies, asking what steps were being taken by their employees with relation to the accident question. Fifty-two replies were received, of which fifteen were from interurban roads and thirty-seven were from roads operating in cities. The information contained in these replies is tabulated below, the figures under each heading showing the nomber of companies pursuing that method. Thus, in the table for city roads it is shown that eighteen companies have "No part taken by the claim department," while five companies have "New men report to claim department for instructions," and also have "Periodical talks by claim department representatives." Thus the footings of the various headings naturally exceed the total number of replies, as several companies use two or more methods.

Type of Road.	New men report to claim department for instructions.	Periodical talks by claim department representatives.	General meetings of employees, claim department topics discussed.	Bulletins, journals and circulars issued in regard to accidents.	Safety leagues for employees.	General schools of instruction.	Claim department schools of instruction.	No part taken by claim department.	Total number of companies replying.
Interurban	2	2							2
	1				1				1
			1						1
	1		1						1
	1		1	1					1
		1				1			1
		1							1
	1	1		1			1		1
					1				1
	6	6	3	2	2	1	1	2	15
City Roads								18	18
	5	5							5
			1						1
		1		1					1
		1				1			1
						3			3
						1	1		1
	2								2
							1		1
					1				1
		1				1			1
		1							1
		1				1	1		1
	7	10	1	1	1	7	3	18	37

The failure of a large percentage of the companies to reply probably indicates that their representatives have done little or nothing in the matter. The replies we did receive show a wide divergence in methods employed. It would seem, therfore, that there is much to be accomplished through these joint sessions. It is to be hoped that the work will finally result in the adoption of uniform methods which will be applicable to electric railway properties of various sizes, in which the work of standardization will be carried out even to the wording and general arrangement of the various forms or instructions.

REPORT OF COMMITTEE ON COMPENSATION FOR CARRYING UNITED STATES MAIL*

BY T. H. TUTWILER CHAIRMAN; C. E. TITZEL, C. H. HILE, J. MCMILLAN, H. A. NICHOLL, A. R. PIPER, J. K. CHOATE, E. C. SPRING, GEO. B. WHEELER

After a careful and full discussion and consideration of reports and actions of the former committee on this subject, it was unanimously resolved that the following schedule of rates of compensation for carrying United States mail be recommended, to-wit:

CLOSED POUCH; CITY OR SUBURBAN SERVICE
(See Note A.)

From one to three pouches inclusive, maximum weight 50 lb. per pouch, carried on passenger cars:
For 2000 miles or less.....$150.00 per annum
For 2000 miles and up to 3500 miles..... 175.00 per annum
Over 3500 miles, for each consignment moving 5 miles or less ..... 5 cents per mile
Over 3500 miles, for each mile in excess of 5 miles ..... 3 cents per mile
Deliveries to and from car to be made by Post Office Department.

CLOSED POUCH; INTERURBAN SERVICE

Maximum compensation paid steam railroads for like service.
(See Note B.)

RAILWAY POST OFFICE SERVICE

For independent cars or compartments in cars:
City service, 1½ cents per linear foot or interior length of car.
Interurban service maximum compensation paid steam railroads for like service. (See Note C.)
Minimum mileage either city or interurban service to be 30000 miles per year per car required in service.
Note A.—Suburban service as differentiated from interurban service is defined as city service extended beyond the limits of incorporated towns or cities.
Note C.—Schedule of rates railway post office car service:

Length of Cars, Inside Measurement.	Rate per Mile per Annum
40 ft.	$25.00
45 ft.	27.50
50 ft.	32.50
55 ft.	40.00

For full information see pamphlet issued by the Second Assistant Post Master General relative to the "Transportation of Mail of Railroads," 1911, pages 7-8.

It was further resolved that the said rates of compensation be submitted to the executive committee of the association with the recommendation that the same be approved, and authority was given to this committee to confer with the proper officials of the United States government at Washington with a view of securing the compensation recommended.

In due course the executive committee of the association approved the recommendation of your committee on compensation for carrying United States mail, and a sub-committee, consisting of the chairman and Committeemen Piper and Nicholl, was appointed to present the matter of increased compensation to the governmental authorities at Washington.

On May 14, 1912, the sub-committee appeared before practically the full committee on post offices and post roads and presented its petition and argument for increased compensation. The same was well received by members of the committee, who informed us that the question of increased compensation to electric railway carriers had never before been presented to them. They asked many questions regarding the subject matter, one of which was the increased cost to the government under the proposed new rates. This the committee was not in a position to answer accurately, but promised to furnish it later, together with other general information asked for. It was stated by the chairman of the committee on post offices and post roads that his committee would require very full information in order properly to consider this matter, and your committee proceeded at once in its endeavor to secure the needed information from the member companies. To that end a letter was addressed to the secretary of the association asking that the member companies be requested to furnish full data relative to the service they are now performing and the compensation received for same. In accordance therewith the secretary of the association sent out a data sheet. After considerable delay and effort on his part, he received replies from 174 member companies, 118 of which carried mails, comprising 208 routes as designated by the Post Office Department of the United States government. The annual compensation on these 208 routes under present rates amounted to $253,608.83, and under the proposed rate would have amounted to $380,726.05, an increase of $127,117.22, or 50 per cent.

The report of the Second Assistant Postmaster General for the year ending June 30, 1911, shows that there are operated under the head of electric and cable-car service 547 routes, and that the annual compensation paid is $681,073.72; therefore, the replies received indicate that only 38 per cent of the routes operated have been reported, and that those reporting receive 37 per cent of the total compensation paid for this service by the government.

Your committee feels much disappointment that the member companies exhibit such small interest in this matter. This is doubtless due to the fact that the carrying of the mail is such a small and insignificant part of their business that they do not regard it as worthy of serious consideration. This is evidenced by the incomplete data furnished and the variation of the present rates of compensation and of the requirements imposed by the Post Office Department. It is the opinion of your committee that if remunerative compensation is paid to the carriers for this service it can be very largely increased, to the advantage of both the government and the carriers, and that the result of such increase would be to add to the efficiency of the mail service at no greater cost than at present, for the electric car service would supplant some of the present more expensive and less efficient methods of handling the mails. This, however, can be brought about only by the full and hearty co-operation of the member companies of the association in furnishing full and complete data on this subject to this committee and in using their influence with their representatives in Congress to secure the necessary legislation to increase the rates and enlarge the service.

Your committee cannot proceed further in this matter of securing increased compensation for carrying United States mail until it has obtained from each member company engaged in carrying mail full information as to the character of service rendered, compensation, etc., in order that it may tabulate and present the information required by the committee on post offices and post roads for the proper consideration of this question. With the matter properly presented, your committee feels that the congressional committee on post offices and post roads will see the inadequacy of the present rates of compensation and recommend legislation for its increase.

*Abstract of report read before the American Electric Railway Association, Chicago, Oct. 7-11, 1912.

COLD-WATER CORROSION TEST RESULTS

Results have been recently published in England of cold-water corrosion tests made in 1-in. pipes 30 ft. long, the temperature range being from 50 deg. to 70 deg. Fahr. The test lasted for nine days. Hot water tests at 125 deg. to 135 deg Fahr. were also made in pipes 5 ft. long with similar fittings, the tests lasting three days. Mechanically filtered water was found to be much more corrosive than the original supply; water from a slow sand filter usually slightly more corrosive; a pond supply, showing virtually the same alkalinity, very corrosive, as also was a driven-well supply. Treatment with lime decreased slightly the corrosive action, while soda had little effect. Heat, both in iron and galvanized-iron pipes, greatly increased corrosive action. Alkalinity with lime increased corrosion with cold, but had a reverse action with hot water. In every case galvanized iron pipes showed less action than iron pipes, defective coating or thread cutting no doubt being to blame. Dissolved oxygen greatly assisted corrosion, the oxygen in the water being greatly diminished after the test. The removal of small amounts of protective organic matter was held responsible for the increased corrosion.

THE CONTINUOUS RAIL*

BY R. F. KELKER, BOARD OF SUPERVISING ENGINEERS, CHICAGO TRACTION

Briefly, the continuous rail is a compound rail consisting of a base which is laid in the track in the ordinary manner and a head section, with depending flanges, which is placed on the top of the base, so that the joints in the head section stagger the joints in the base section. After the head section has been so placed the machine is run over the track and crimps in the flanges of the head section, so as to form what is in reality a compound girder.

The process and the machine for crimping the rails together are the invention of Edgar Rhodes, an English mechanical engineer. Before introducing this system into America it had been tried out in England and in France. The action of the machine upon the flanges of the rail is novel and ingenious. As the machine passes over the rail two opposing rollers engage the depending flanges of the head section and from the beginning of the operation cause the metal to flow in waves. As the operation continues, the flanges are cold-rolled until compression strains develop on their outer sides, converting them into powerful springs which grip the head of the base rail and force part of the under side of the top of the base. The resistance of this grip to a force exerted to slip the head over the base has been shown by tests which were made by R. W. Hunt & Company, of Pittsburgh, to be over 36 tons to the running foot.

The machine which was brought over last year to crimp the Chicago section was designed to work upon a rail having flanges ⅜ in. thick, of 0.45 carbon steel. It was called upon to handle flanges of 0.60 carbon steel, which in some cases had a thickness of over ½ in. As a consequence, this machine was overloaded from the start and was unable to crimp more than 100 ft. an hour. After a mile of track had been crimped on the west side of South Halsted Street, between Thirty-first and Thirty-ninth Streets, weather conditions interrupted the work and nothing further was done in the matter until last month. In the meantime a more powerful machine had been designed and constructed. This new machine is electrically driven, whereas the machine which crimped the rail last year was operated by steam.

The new machine has just finished crimping one-half mile of track on the north side of Forty-seventh Street, west of Paulina Street, and in the first few days of its operation has shown its ability to crimp 680 ft. of track, or 1360 ft. of rail in an hour. It is confidently expected that it will do so when the bearings run smoothly and the new machine has settled down into its stride.

The rail laid on the west side of South Halsted Street was subjected to excessive variations of temperature during construction, the thermometer in one day dropping from 74 deg. Fahr. to 12 deg. Fahr. It has stood the test of the most severe winter ever known in Chicago and has this summer been exposed to a heat of over 100 deg., when the thermometer registered 95 deg. in the shade. An inspection of its present condition can easily be made, as the track begins a few blocks north of the entrance to this building on South Halsted Street. It is the track on the west side of the street, that on the east side being laid with our standard construction.

An interesting feature has developed in connection with the method of manufacturing these rails in the rolling mill. Both Trilby and T rails pass through the rolling mill on their sides, so that during their manufacture the pressure of the main rolls is exerted upon the web of the rail and only indirect pressure upon the wearing head. In the continuous rail the base is rolled in the same manner, but the head is rolled upside down, so that the direct pressure of the main rolls is exerted during the last seven consecutive passes upon the wearing surface of the rail. The result is that the metal in the head of the rail shows great homogeneity and closeness of texture. The density of the metal, as compared with other rails, is only about 4 per cent greater, but the effect of this increased density upon the electrical conductivity of the metal is very great.

Calculations based upon tests made by Mr. Rice and Mr. Thurlby show that the metal in the head section of the continuous rail has about 74 per cent greater conductivity than an equal section of our standard rail metal.

After the head had been crimped to the base and the track was completed without any welding of the joints, the resistance of 1000 ft. of continuous rail was found to be 0.004485 ohm, whereas 1000 ft. of our standard rail with the joints electrically welded showed a resistance of 0.00704 ohm. Twenty-two per cent of this increase was due to the increased area of the cross-section of the continuous rail. The rest must be ascribed to the method employed in the manufacture of the rails in the rolling mill.

For street railway purposes the whole rail is crimped in tight from end to end. For exposed work, as, for example, on interurban lines and on steam railroad lines, it is proposed to crimp in solidly about 90 per cent of the rail and to avoid crimping compression strains on the remaining 10 per cent of the rail at each end, so as to form a sleeve joint between the upper and lower sections. The joints of the upper rail in the case of a 30-ft. rail for street railway purposes would be placed midway between the joints of the lower rail, and for open-work construction these joints would be placed 3 ft. away from the joints of the lower section.

It is only fair to say that the foundation of the track south of Thirty-fifth Street is of unrolled ballast, as the early appearance of frost last year made it inadvisable to fill in concrete in bulk, which was the original intention. Furthermore, the exigencies of our traffic required us to run our cars on both sections north and south of Thirty-fifth Street within a couple of days after the rail had been crimped, and the grinding of the joints was not taken in hand until last June, about six months after the track was laid. The southbound traffic on South Halsted Street is 730 cars per day, so that about 230,000 cars or 920,000 axles, have already passed over the continuous rail.

It is also to be noticed that there are no streets running directly across South Halsted Street—even the cross streets have staggered joints—so that the motormen have no cross traffic to interfere with their running, and the traffic is speedy as well as heavy.

*Abstract of a paper read as a part of the discussion on way matters before the American Electric Railway Engineering Association at Chicago, Oct. 7-11, 1912.

ANCIENT METHOD OF CASTING BRONZE

The *Engineer* of London states that the molds of the latter Bronze Age were either of clay or bronze. In casting swords and daggers of bronze the molds must have been of clay and been heated to dull redness at the time when the metal was poured in—a method of casting which is still practised in Japan—as by no other means could such perfect castings of their thin blades have been obtained. The castings generally were hammered at the cutting edges, and it is to this hammering, and to it only, that the hardness of the cutting edges of both copper and bronze weapons is due, and not to any method of tempering. Much has been written about the so-called art of tempering bronze, supposed to have been practised by the men of the Bronze Age in the manufacture of their weapons. The hardness is also said to be greater than can be given to the bronze at the present day. It has recently been pointed out that this is an error, and the opinion is expressed that it could only have arisen owing to the fact that those who held this opinion had never made any comparative practical tests of the hardness of bronze.

AUTOMATIC RATE REGULATION*

BY OSCAR T. CROSBY, PRESIDENT WILMINGTON & PHILADELPHIA TRACTION COMPANY, WILMINGTON, DEL., AND PRESIDENT TRENTON & MERCER COUNTY TRACTION CORPORATION, TRENTON, N. J.

The topic originally suggested to me for discussion was "Some New Principles." Perhaps, indeed, something new and useful may be found in the definiteness of formula which I have to present in connection with our subject. But the elements which enter into the problem I think can be traced in the decalogue; I think they may be found throughout the statutes of all civilized nations, and I trust they may be found in the consciences of various commissioners lately called upon to exercise authority over their fellows. Hence the more or less appropriate title "Automatic Rate Regulation." It is not a new principle to demand that investments made a few years ago, when no thought of limitation had been presented or, if presented, would have been entertained, should now be left undisturbed by arbitrary power. But it may be a relatively new convenience, in dealing with these matters, to establish a definite sliding scale of return as between investments made in the past under conditions of great risk compared with investments made in the same enterprises under conditions of less risk. The House of Lords declared it preposterous to allege high dividends as a reason for reducing rates. Contrasted with this decision, the proposition that "return to capital" shall in future be taken as almost the sole measure of "reasonable rates" is new. But it is not new as compared with the suggestions of courts and the general trend of public opinion throughout this land.

I believe, as a matter of fact, that the House of Lords' decision, which is still quoted by our attorneys, is rather a handicap to us than a help, for it is now being considered by some as having been definitely replaced by the Supreme Court decision in our own country. That decision has suggested to many minds that 6 per cent upon something vaguely called by the court the "value of the property" is a limitation proper to be observed. Some have taken comfort because the Supreme Court has recognized franchise value as one element of value. As a matter of fact, the court, delicately handling the question of unconstitutionality in a statute, was merely putting up a boundary around property so that any incursions within that boundary should be called confiscations and should thus be declared illegal. It was not fixing 6 per cent as a limit upward but as a limit downward.

It seems to me, however, that before the court can pass upon what is confiscation of property it must pass upon what is property; and if the House of Lords' decision, conveying the usual common-law view of the subject, be at all accepted, then not 6 per cent but 16 per cent, or 60 per cent, would be an allowable return upon capital invested in a public utility. There is no indication that the Supreme Court would have let in such a return as fixing "franchise value." There is no indication that the court would protect 60 per cent dividends. Yet that was the essence of the House of Lords' decision. It would then be as much confiscation of property to make rates aimed specifically at a reduction from 16 per cent to 8 per cent as it would be confiscation to aim at a reduction from 6 per cent to 3 per cent. It was a property right to earn 16 per cent, or whatever else the property may have been yielding at the time, because no check had been laid by the common law upon these returns. It was confiscation of property to destroy these returns by lowering rates solely because dividends had been high. We should not for a moment concede that the delicate compromise effected by the Supreme Court in order to protect something which it should eventually decide to be property must be taken as a guide for commissions in establishing rates as related to the returns that are permitted to capital.

We must go further than these strictly legal precedents. We must insist that a great question of public policy is now before the country for determination, and we must resolutely urge our attorneys, urge all of our representatives before commissions and courts, to resist the theory that any courts have established, or have the power to establish, any upper limit of return to capital. They distinctly disclaim such power.

THE "NEW POLICY"

In this matter of public policy it is some of the commissions, some of the attorneys of commissions, who are urging that which might be called the "new policy." They are urging substantially this theory, that investments made without thought of limitation, investments made honestly in the purchase of experimental machinery necessary for the development of an art, are no longer to be considered as entitled to those varied and rarely large returns which were obviously in the contemplation of all when the investments were made.

In Baltimore a few days ago I heard from the lips of a very charming young lawyer representing the people in a case before the Public Service Commission of Maryland a statement as to the principles which he believed were now established by courts and commissions and which should morally guide the Maryland commission. Substantially, the case was going on ground already too familiar. Endeavor was being made to create that fantastic entity called "replacement value." This having been erected, it was intended to allow to it some rate such as 6 or 7 per cent. The principles supposed to govern, as stated by the attorney, were such as, if rigidly followed, would permit nothing more than bond interest to be paid by the company in question. Anything beyond that he called a gratuity.

Suppose any man in my hearing should endeavor to promote a new enterprise upon such a basis. It is perfectly plain that he could not get money from experienced men if he explained to them the conditions as stated. Let us be clear as to what these are. They are now being urged, *ex post facto,* in the arguments before commissions. Let us see how they would sound if they surrounded an entirely new project. They amount to this, that all the money which we are to put in the project now and which may in the course of time be swept out of actual existence by virtue of changes in machinery shall no longer, at some day of rate regulation, have any standing in court. They further suppose that all the losses of return during lean years shall have no standing in court. They suppose that all the vexatious processes which time involves in the slow building up of an enterprise shall have no place in court. They suppose that some unheard-of contract shall be let for the complete construction of the public utilities of a great city. They suppose that to this shall be added some so-called "reasonable" amounts for supervision and for various other elements more or less the subject of contention.

Eventually some absurd figure is reached which has about as much relation to what may have been the actual cost of the property in the last twenty-five years as the number of second-story windows in the city would bear to that cost. Now, let us suppose that all this is laid before an investor and that it is further added that he will not be allowed at any time to earn more than 6½ or 7 per cent on his cash invested. I repeat that it would be perfectly obvious that an experienced business man would reject the whole proposition as absurd. If, then, I actually succeed in floating an enterprise to-day on the principles which are proposed for the guidance of commissions, then it is obvious that I must have got my money either from experienced men by suppression of the facts or from poor devils, inexperienced in business, who cannot understand the complications of business and whose money is taken from them and put at serious risk under conditions which should be counted as nothing less than knavery on the part of him who should guide such people. It would then be the duty of the splendid young attorneys who draft them-

*Abstract of address delivered before the American Electric Railway Association, Chicago, Oct. 7-11, 1912.

selves into the so-called "uplift" movement to prosecute men who should apply the principles they now ignorantly espouse. How absurd is the whole situation!

Let me repeat, in order that it may be kept in mind, that to raise money for a new enterprise according to the principles being urged upon many commissions would involve that either misrepresentation had been practised in dealing with intelligent people or that poor gudgeons had been entrapped who were incapable of understanding the complications of business.

The true principles, as I understand them, which would govern in these cases may thus be stated: Returns upon capital invested in the past should not by arbitrary rate regulation be reduced. In time they inevitably will be reduced by the inexorable law of decay. Competition, bad management, change of supporting industries, increased cost of operation—some or all of the never-tiring canker worms will surely destroy the now lovely flowers. Meanwhile, no matter how high these returns may have been, they were permitted by the general consent of the public and by the established principles of common law, and they have served as the basis for the purchase and sale of securities throughout the land.

DIFFERENT RATES FOR NEW MONEY AND FOR OLD MONEY IN OLD ENTERPRISES

Passing now to the new money to be invested in old enterprises, I urge above all things that definiteness should be reached; that there be no room for further backing and filling such as is now taking place throughout the country. We are now exhibiting to the world a chaotic condition in serious business matters which must make us hesitate to declare ourselves a clear-headed and practical people.

Let us be definite in respect to the fact that old money in old enterprises shall be permitted to receive whatever returns it may have received in the past, no matter how high, and that if we are to be limited, as I believe we shall be, as to returns for money invested in the future, then the amount of such allowable returns shall be definitely fixed.

It may be asked how can these two separate rates of return be allowed to the same property. The matter is extremely simple. Suppose that fifteen years ago you had established a public utility at a cost of $1,000,000. Suppose we had been earning 20 per cent on that $1,000,000 ever since. Suppose that now in some extension we desire to spend another million dollars. But the public says to us: "You have made money. You have had what must be considered very satisfactory—indeed, unusual—returns. Now you have grown. Your strength is due to the partnership that exists between you and us. We have the power, and we intend to exercise that power, of regulating your rates with respect to the returns to capital. The new million dollars which you now desire to put into this old enterprise, we think, should be limited to 8 per cent."

Suppose, then, this agreement is definitely made. It would be sufficient, in order to be executed, that the total profit to the stockholders, bondholders, or to interested parties in whatever classification, which shall be annually taken from the property in question, shall not exceed $280,000. If there is this limitation, then the old principles of fair dealing will have been observed and another old principle will have been established; namely, that there shall be a definiteness of contract between parties having important relations to each other. It will not be in the least necessary that the public should concern itself as to how the $280,000 profit annually taken from the enterprise shall be distributed. It is far better that this should be left to those who have the responsibility of conducting the enterprise. Whether this money goes to bondholders, stockholders of one class or another or to noteholders, all this may be left for private adjustment. The upshot of the matter will be that an average of 14 per cent will be permitted, and that of course there is no guarantee surrounding the matter in any respect whatever.

Some will say, "But even this is too high. Shall the public be definitely burdened with 14 per cent on $2,000,000 engaged in a public enterprise?" My answer to that objection is this. That, alas! nothing in human affairs is permanent enough to warrant the supposition that there should be an everlasting return of 14 per cent upon this money. Something will happen, something has always happened, to destroy every enterprise which man's hands have established. We may be quite sure that disaster in one form or another in the course of years will intervene to upset the carefully arranged plans which so occupy our minds to-day. Hence, as an individual of the public which is to permit rates that in themselves may return 14 per cent on this $2,000,000, I may cheerfully say to myself that my great-grandchildren will be entirely freed from the matter and, in some way or other, will be dealing afresh with the question, let us hope with more intelligence than we are now dealing with it. And it must be further supposed that any such return as I have supposed would be an exception—one of those necessary exceptions of high return, balancing great losses elsewhere and helping to constitute that average return which has never been excessive.

On this point, as to how different rates may be carried with respect to investments made at different times in the same property, let me advert to the fact that automatically the Massachusetts Railroad Commission brings about just such a varied return. It is familiar to all of us that after stocks in Massachusetts have obtained a market value of, say, $200 the new issues of the same company are required by the Massachusetts commission to go out at approximately the same price.

The early investors in such a stock (or their successors in ownership) will continue to receive, let us say, 10 per cent on the original investment, the rate which presumably has been paid for some time in order to warrant a market valuation of $200. The new investor will receive only 5 per cent on his money. He, however, has the advantage of going into an enterprise which time has assured. While I do not believe the Massachusetts law is wise in so far as it prohibits the issue of stock representing only hope and personal service (commonly called "water"), I do believe it is wise in this automatic adjustment as between the returns to old money in old enterprises and the returns to new money in new enterprises. It is apparent that the same principle is involved in the bill drafted by me which some of you may be interested enough to read, and which appears in the pamphlet which has been distributed. This bill proposes a sliding scale which shall be automatic in its application. By virtue of this scale, large orders in the past shall cause the public to obtain rates which are based upon smaller returns for money freshly invested, and there is a danger to the public if franchise conditions remain uncertain.

What I have in mind is that commissions throughout the country are taking over vast powers without definite rules for their guidance. It would be too flattering to the humanity which is our common inheritance if we should suppose that the exercise of such powers without definite guidance of established rules shall go on with as little corruption as has thus far attended the work of regulation. The fact is that in their first years of activity the commissions have been generally well officered, so far as honesty is concerned. Experience, of course, has been lacking, and many mistakes have been made, largely because the subject does not permit of progress to be made without mistakes when the law-making power keeps its hands off the subject which it should, as a matter of fact, largely and definitely control.

"REASONABLENESS" IN RATES

However, as time goes on, it seems almost inevitable that there shall be, because of the exercise of vast and uncontrolled, unregulated, unruled power, corruption which may become a stench in the land in which it is established. It is not sufficient that commissions shall be put in office with the vague statement that they are to establish "reasonable" rates. Since the world began, men have cut each other's throats most

valiantly in the endeavor to determine that which is reasonable. Has any army ever gone to battle declaring that its cause is unreasonable? In the matters which still continue to come before the commissions, is there not the widest possible variation in the application of this word? Certainly, from every point of view, as citizens and as interested parties, we shall be the gainers if the contracts governing our relations with the public shall include, among other definite conditions, this chief of all conditions, this condition which permeates and controls every other, this condition which, in itself, is the very motive of the whole performance—namely, the allowed return to capital.

We have gone about the matter with a good deal of particularity in requiring so much paving to be laid—just 2 ft. or just 18 in.; posts of such character to be erected, or hundreds of other minor conditions set forth with a good deal of labored particularity. But how rare it is that we have had a complete understanding as to the matter which, in the end, controls the fixing of rates—namely, the return to capital!

More and more will this feature be prominent. There is, besides the thoughful effort which all good citizens are making to put some bounds to the powers of public utilities, a vague jealousy on the part of those who do not understand these matters and who only know that considerable fortunes have been made in these enterprises in which the public is directly concerned. This jealousy will cause a rising tide of clamor against the making of large returns. It will be more and more necessary that some definite understanding should be reached in order that destruction shall not be visited upon the properties which are supposed, justly or not, to be money-making.

It has been thought that in our particular industry the acceptance by most companies of a fixed fare limit would remove the question of return to capital. It was a fair assumption, having undertaken to do a certain piece of work—namely, to carry a human being from some one point to any other point within the city limits for a given sum of money—that any profit resulting from the transaction would be left to the contractor. Such is the usual rule. It does not require the House of Lords' decision in this case to establish the apparent justice of the position that the contractor shall take whatever profit comes from carrying out a "piece-work" contract, since he must bear whatever loss may result. Yet, in spite of all this, it is perfectly apparent that the street railway industry must not only meet the question of a limited fare but also the question of a limited return of capital. Many of us read with some amazement the recent decision handed down in the Milwaukee case. I shall not endeavor to criticise that decision in detail. I only want to emphasize, by referring to it, the fact that, in spite of the solemn engagement of a city with a public utility to permit the charging of a certain rate, the commission undertakes to fix rates by virtue of some assumed reasonable return to capital, and capital is made to mean not investment but some fanciful thing called "value." It is vain for us to say that we will take these cases continually to court; that is to say, it is vain to suppose that this will establish a general public policy. We must believe that the court will protect those contracts which can be definitely shown to have been made by proper public authority. General public policy must be otherwise fixed. A good many street railway franchises are maturing from time to time and requiring fresh treatment. In these cases the whole subject of definite contract with the public can be and ought to be brought up and thrashed out. It is in such cases that I believe the application of the principles shown in the bill which you are asked to read can be most advantageously made. In such a case, which is practically that of a new enterprise, we are able to see beforehand, if the principles of the bill be adopted, just what course will be followed in respect to return to capital.

We are enabled to see that if we prosper largely we at a later date shall be expected to lower the rate of return to capital invested at that later date. But the lower rate has a definite relation to the higher; meanwhile the investment is protected from annoyances and forced expenditures which are substantial reductions of rates. Automatically at distant dates these lower returns to capital and some corresponding diminution of rates will take place. But meantime we shall have all that can come to us within the agreed limits that cover the original risks from the operation of our business.

"PIECE-WORK" PAYMENT

We shall doubtless be required in our particular industry to take the additional burden, the additional risk, of a fixed "piece-work" payment. This must be taken simply as one of the elements of the problem, and our familiarity with the business must warrant this double risk, provided a limit of return to capital for new money in a riskful enterprise shall be sufficiently large to attract investment.

In any case I urge that it is far better that the matter should be treated with perfect definiteness now. Let us have it out. Let us know whether we are to have for future investments 1 per cent, 2 per cent, 40 per cent, 60 per cent—whatever it is, let us know; let us put it down on a piece of paper and let us cease squabbling, as we now are, throughout our country like a lot of children playing with blocks in the dark.

It is, however, not only in new franchises in new territories and in new franchises taking the place of those now expiring that we must give attention in this matter to return to capital. Even in those cases in which courts have upheld the fixed fare, it remains that commissioners will endeavor in various ways, unless the general spirit is changed, to burden prosperous companies until they shall cease to earn the dividends to which they are justly entitled. In some way or other, if the general rule to close limitation be adopted in cities where the matter is open, an endeavor will be made to apply it even in cities where the fixed fare has become a closed question through judicial decision.

EFFECT ON EXISTING FRANCHISES

I am aware that many who are engaged in our industry will feel that it is best to let things work along without instituting changes in existing franchises. They feel that somehow or other there will be some rough justice done in the future and are averse to inserting definite provisions concerning return to capital in franchises in which no such provisions appear. And, indeed, in some cases this may be the wiser policy; yet, even for those who are thus conditioned it is a matter of wisdom that they should help throughout the country to establish definite policies in cases of franchises now maturing or in cases in which new franchises in new territories are being undertaken. It is desirable that the right principle of control should appear in such new franchises, because by reflex they will have an effect upon the administration of the older franchises in which no limitations or protections appear. We must remember that since the question is so urgently before the public, throughout the country, it will be easy for commissioners to rule six or seven years hence that everybody who now puts in his money may be supposed to be on notice that the 6 or 7 per cent rate on replacement value is considered as established in public policy.

Of course, it is not yet thoroughly established. It is merely that the drift is in that direction. Yet there will be some reason for alleging that investments made now with no protests must be considered as having been made with a view to their regulation in this close and unjust fashion. It is, therefore, in my judgment, far better, even in the matter of old franchises, if large investments are now required, to have a distinct understanding—even to the extent of a complete rewriting of the franchise. In such a rewriting I feel that the whole matter of taxation of public utilities could be simplified enormously if we had an agreement as to return to capital. For then all cumbersome machinery to which we now resort would appear, as it really is, "robbing

Peter to pay Paul"—shifting of money from the right-hand pocket to the left-hand pocket, a childish and barbarous performance unworthy of men with beards on their faces. We should also be able to eliminate the vexatious paving conditions and a number of other burdens which the public in its vague endeavor to limit returns to capital is from time to time thrusting into street railway franchises.

The whole thing should then be reduced to a pure money basis, so much for a piece-work job and so much allowed as return to the contractor. A hundred little vexatious points of contact with public officials would be removed. Let me, therefore, repeat that on occasions when large investments are required in old enterprises, or when franchises are expiring and require to be renegotiated, or when entirely new franchises are being taken out for new situations, these principles should be in the minds of all concerned in our industry.

I urge it strongly, not only because of the interests which we represent and which, in my judgment, can thus be best served, but I urge it very strongly as a citizen of the United States, desiring keenly that an intelligent and peaceful relationship should be established between the public and those great bodies serving the public as street railway companies, lighting companies and other public utilities. I consider it a matter of the highest political moment that the whole present status should be relieved. It is not good that individuals of the general public who, in the nature of the case, can never acquaint themselves with the particulars should constantly be reading of the dickerings and fightings between commissions which are supposed to represent them and the corporations which are supposed to be mere graspers after money.

Let us endeavor to get the whole matter in some perfectly definite shape. Let us cease to cut each other's throats in an endeavor to determine that which is reasonable. Let us define it before we form a partnership.

REDUCTION TO DEFINITE FORM

Time does not permit me to discuss the details of the bill which I have drawn covering this whole subject. I desire to point out, however, one matter which has given much concern; that is the disposition of the question of surplus. After drawing the bill in the first place, providing that all surplus should be divided between the public and the wage-earners of the corporation, if surplus should have been gathered in excess of a limited return to capital, I have now redrafted the bill, providing that surplus should be permitted to be gathered in order to make extensions or betterment to property. This I believe to be very important. We are constantly brought to face the fact that a number of investments must be made in improving physical conditions which do not in and of themselves increase the net revenue of the company. For these purposes it will be difficult to obtain capital from the public, and, therefore, these purposes should be covered as far as possible by surplus gathered from the operation of the company itself.

The subject is one of much difficulty and of very great importance. I can but refer to it now, asking that each one of you, in so far as the matter interests you, will take it well into consideration in such study as you may give to the bill in question.

Other features of the bill which may require some explanation are as follows:

Long periods, namely five years, are suggested as those at the end of which auditing shall be made to determine whether or not agreed limitations to capital have been earned. These may be, in the estimation of many, too long. Doubtless public officials, particularly, will consider that shorter periods should be agreed to. Yet I am firmly of the opinion that serious errors, sometimes operating in one direction, sometimes in another, will result if periods of one or two years be adopted in this respect.

I have also taken the five-year period as a rule for determining those companies whose outstanding stocks shall be left untouched by any rate making, leaving them to the vicissitudes of time. These are what may be called old companies. A "rule of thumb" indeed; but we are controlled throughout life by rules of thumb. We cannot get away from them. It has seemed to me that within a period of less than five years some intelligent investigation may be made as to investments which have really gone into public utility property. But I believe it becomes almost impossible to get up these actual investments if we go into a past longer than five years. Consequently, the actual securities in the hands of the public, it seems to me, should be respected when a certain time has passed such as warrants us in the supposition that the securities have passed from hand to hand on the basis of their earning capacity actual and partly estimated in the past.

It has also seemed to me necessary, considering those old companies which have not been prosperous, that it should be understood that the outstanding stocks might be permitted to earn up to say 10 per cent, and if they earned more than 10 per cent that the higher rate should in no way be disturbed directly and intentionally by rate making. The 10 per cent thus suggested as an *ex post facto* limit to old but low-rate stocks is also a rule of thumb. It flies in the face of the House of Lords' decision, but it fits absolutely with what is the fixed determination of this country; namely, that some limited return to capital shall be taken as the principal basis for fixation of rates.

It seems not too high, because unquestionably the stocks issued prior to a period five years ago have all been taken with the hope that they might reach, not 10 per cent, but 15 to 20 per cent, or even higher. If they have not yet attained that figure, it seems to me unwise that the public should make it impossible that they should attain it, for undoubtedly the hope of these higher returns partly fixed the price of senior securities that may have been sold and also the price at which these stocks have gone into the hands of thousands of distinct purchasers.

When we come to consider companies that have been in operation for less than five years, the bill supposes that certain investigations may be made establishing the capital value, so-called, actually going into the operation of the company. This "capital value" is likewise defined in the bill. As thus determined, rates are fixed for the present and the future according to a sliding scale of return to "capital value." This scale, as will be discovered on reading the bill, may be made to apply to companies now in existence as well as to companies yet to be formed. The same sliding scale takes care of the returns to new money invested in an old enterprise, as well as to old money in old enterprises and to new money in new enterprises.

The bill provides that if these returns to capital are not exceeded, then the rate-making power will not intervene merely in order to affect directly the earning capacity of the corporation. It supposes, however, that the rate-making power, or other proper governmental authority, shall intervene to control absolutely the matter of discrimination. In this I am a radical of the radicals. I believe it to be the highest duty of a public utility to give Smith and Jones absolutely the same rate, if they are purchasers in like class of the commodity dealt in by the public utility.

SOME DEFINITE POLICY SHOULD BE ESTABLISHED BY LEGISLATURES

It has seemed to me that a great good could be accomplished, assuming the justice of the provisions contained in this bill, if such provisions were presented to legislative committees in every state of the Union. Let us endeavor to have in each state a general status passed which shall embody the principles that are to govern commissions in the fixation of rates. If I am correct in supposing that this country has determined that the House of Lords' decision does not control and that some rules as to returns on capital shall largely or wholly

determine rates, then let us urge that legislative bodies adopt a scheme definitely setting forth the returns thought to be wise in each of our states. Let us urge that in respect to "old money in old enterprises" there shall now be introduced no limitation unless it be a limitation upon old stocks which have earned less than 10 per cent and which may be permitted to go up to that point. Let us point out that all general principles in life must finally be reduced to specific rule of thumb, and let us then endeavor to have either the particular rules of thumb appearing in the bill which I have ventured to present for your consideration or some others that seem wiser.

Let us in any case urge that perfectly definite figures appear in respect to the allowed return to capital that is yet to be invested in public utilities. Such declarations of principles laid down by legislatures for the guidance of public service commissions would immensely relieve the situation throughout this country, and I desire to urge with all the strength that lies within me that legislative bodies and not commissions of two or three men should determine questions of such vast importance as those which we are now discussing.

When guiding principles shall have been established, then, indeed, the work of three, four or five commissioners may be excellently done. But it should be the administration of general principles and not the Solomon-like determination offhand, without any guidance whatever, of what men engaged in public utilities shall be permitted to earn.

If the task of obtaining such legislative enactment shall seem too great, if that which is everybody's business shall turn out to be nobody's business, then I urge that every man engaged in a public utility who must face the question of getting a new franchise or remodeling an old one shall give attention to the subject of definiteness. I repeat, definiteness, definiteness, definiteness.

Indeed, let me put it in this way. If there is some other rule that is definite, some other rule than the return to capital which I have endeavored to elaborate, then because of its definiteness I should be in favor of that rule. I shall gladly throw into the waste basket the work which I have rather laboriously done in this matter, if only we can discover some substitute for it. I believe that the House of Lords' rule will not be followed now, and I believe that "return to capital," limited in one way or another, is in fact the best general guide for the reasonableness of rates. This does not carry with it the taking away of large earnings in the past, as has already been explained. The acceptance of those large earnings in the past can be taken as one of the definite rules of procedure by commissions, while, as to future investments either of new money in old enterprises or of new money in new enterprises, more specific and limiting figures can be made to apply, which will place the whole business on a higher basis of common sense. It is not common sense to undertake to do contract work at a rate which is wholly to be fixed by the principal, who guarantees nothing whatever and has power to change the specifications at any moment. We are contractors who absolutely will be limited as to profits by our principal. He has determined to do it; let us now obtain from him a perfectly definite statement as to what percentage of profit we are allowed to make, and when that has been done let us cheerfully go about our business or let us throw down the burden and undertake something else.

PRECAUTIONS WHICH SHOULD BE OBSERVED

Let me close by indicating certain precautions:

First—The moment's specific allowable returns are mentioned. Many persons think some guaranty is involved—of course, none is meant. To clear the fog, it may be well to point out that in the years when public utilities were left quite to themselves, hoping for great returns and fixing their rates with a view to earning such great returns, the vicissitudes of life and errors of judgment were such as to cause the irretrievable loss of a great many millions of dollars.

Second—The business is riskful, and it is expected to remain so.

Lastly—The public cannot make a serious error in fixing returns to new money in new enterprises. That is because two are required to make a bargain. Smith will not go in if he is told beforehand that he cannot make a profit commensurate with his risk. So that matter will take care of itself. But the public may make an error concerning old money in old enterprises and concerning new money now going into old enterprises. Unless properly informed by those who are interested, the public can and may make the error of a tyrannical use of power. It can and may make an error scarce falling short of repudiation. It can forget that good service, good wages and good dividends constitute a trinity, but also a unity—forming three parts of an indivisible whole.

ELECTRICITY AND THE PUBLIC

Twenty years ago it was customary for bicyclists to dismount, if they were sufficiently considerate to do so, whenever a horse passed them. Traction engines usually went through country roads with a man in front carrying a red flag. The first trolley cars, in fact, caused almost countless runaways. To-day no one would expect an automobile to slow down when passing a carriage because it is perfectly well understood that the horse is quite used to the sight and will not shy or run away. On Eleventh Avenue in New York City ordinary steam locomotives are run upon the tracks laid in the middle of the thoroughfare instead of the dummy engines boarded up all around which were used a generation ago. Even steam shovels, which have probably the most alarming appearance of all portable machinery, have been seen upon New York's busiest thoroughfare, Fifth Avenue.

The question brought up by all this is whether the time is not soon coming when we no longer shall hear reports of stampedes of passengers on account of a blow-up in a street car controller, the pulling out of a canopy switch, or even the blowing of a fuse. Panics from these causes have undoubtedly inflicted many injuries in the past, yet there seems to be very little reason for such an occurrence to do more than startle people on account of the suddenness of the flash and noise. Passengers undoubtedly ought to become familiar with the phenomena of street railway operation after a reasonable amount of experience with them, and since the horse, which has been described as a "brainless anachronism," can become used to the various startling sights of modern civilization there really seems little excuse for passengers to begin a wild stampede because of a flash and an explosion.

In Great Britain the pay-as-you-enter car is to be applied in Aberdeen on one of the principal city lines. The cars, as is usual in that country, will be of the double-deck type with end staircases from each platform to the upper deck. The conductor will stand between the foot of the stairway and the entrance door to the lower portion of the car. All entering passengers pass in front of him. Exit from the lower floor will be made from the rear platform through a bulkhead door separate from the entrance door. Passengers on the upper deck will leave by the front stairway, which lands them on the front platform practically in front of a small door corresponding to the front exit door on single-deck cars in America. This door will be controlled by the motorman.

Practically all the electric railway companies within a radius of 500 miles of Chicago are relaying all the heads of departments to the convention. This method of arranging a schedule is largely responsible for the large total registration of railway men.

REPORT OF COMMITTEE ON LIFE OF RAILWAY PHYSICAL PROPERTY*

BY ROBERT N. WALLIS, CO-CHAIRMAN; A. R. PATTERSON, H. E. WEEKS; MARTIN SCHREIBER, CO-CHAIRMAN; JOHN LINDALL AND F. B. BATCHELDER

Your committee was instructed by the executive committee of the two associations to give consideration to and report on the life of railway physical property.

The subject before us originated in the Accountants' Association at the request of the officers of the American Association, and a committee report may be found in the 1911 Proceedings of the American Electric Railway Accountants' Association, pages 200-203. For reasons stated in that report the Engineering Association was joined, and two meetings have been held by the joint committee at the association rooms in New York, the first on Jan. 25, 1912, and the second on July 11, 1912. In addition to the meetings, much interim work has been done by the members of the committee and others who have been called upon to assist them, notably in securing data to file for the use of members in the association rooms. Attention is especially called to this branch of the work, and members interested in the subject are urged to make use of the data so collected and arranged.

At the meeting in January the scope of our work was thoroughly discussed, and serious consideration was given to the possibility of ultimately providing comparative figures for the life of various elements of railway property with a bibliography and other statistics. From the beginning was recognized the difficulty of formulating any definite figures which could apply generally, because of the variable features involved and the differing conditions at different locations. It was also realized that in any search for original data materially different figures would be received even if all the conditions were carefully defined. Therefore, no attempt has been made to strike any general averages either as to authorities quoted or from any data collected from members concerning life of railway material. In the opinion of your committee, it would be unwise in the present state of the industry to attempt to do so. Information and figures on this subject can be obtained and recorded only as a guide for study and not as a rule for action.

Your committee therefore outlined its work to include the gathering together and rendering available for the use of the association membership of facts and figures relating to the subject committed to it. Not only do we deem it important to gather such information as may have been published from time to time upon this subject, but also, as possibly a more valuable branch of the work, to secure from authoritative and experienced sources original data which have not been made available for general use.

Investigation of existing tables concerning the life of railway physical property compiled by different authorities shows a lack of availability for comparison because the tables are not consistent in the consideration of similar items.

It was the opinion of your committee, therefore, that a certain standard classification should be formulated as a guide to investigation upon this subject, and your committee therefore adopted as standard the following classification for consideration of the life of railway physical property item by item:

Buildings and Structures

1. Buildings (frame).
2. Buildings (brick), stone and concrete foundations and walls; wood roofs and floors.
3. Buildings (brick), stone and concrete foundations and walls; including floors and roof of concrete or fireproof construction.
4. Dam (concrete, earth).
5. Dam (wood, earth).
6. Dam (earth).
7. Flume (masonry).
8. Flume (wood).
9. Flume (steel).
10. Conduit for wire (terra cotta).
11. Conduit for wire (creosoted wood).
12. Bridge or trestle (steel with concrete foundations; P. R. W.).
13. Bridge (steel with concrete foundations; wood roadway).
14. Bridge (steel with concrete foundations; roadway with concrete foundations and permanent paving).
15. Trestle (yellow-pine piles and timber, untreated).
16. Culvert (masonry).
17. Bridge (concrete).

Equipment

1. Car bodies.
2. Control equipment.
3. Air-brake equipment.
4. Motors.
5. Trucks.
6. Miscellaneous shop tools.

Power Distribution

1. Trolley wire.
2. Third rail.
3. Feeder (W. P. insulated).
4. Cable (conduit lead-covered).
5. Poles (iron).
6. Poles (wood).
7. Tower (steel).
8. Line material.
9. Signals.
10. Automobile truck.
11. Horse vehicles.
12. Horses.

Power Generation

1. Waterwheel.
2. Engine (steam).
3. Turbines.
4. Boilers.
5. Condensing system.
6. Piping system.
7. Producer (gas).
8. Engine (gas).
9. Generator.
10. Converters.
11. Transformers.
12. Switchbord apparatus.
13. Storage battery.
14. Coal-handling machinery.

Way Matters

Track in paved streets, assuming seven and one-half minutes' headway with five-minute headway in rush hours, 30-ton double-truck cars.

1. Ballast.
2. Rail.
3. Joints.
4. Ties (untreated).
5. Bonds.
6. Hardened center special work. Open track, same headway and weight of cars as above.
7. Rail.
8. Ties (untreated).
9. Joints.
10. Bonds.
11. Special work.
12. Miscellaneous track machinery.

What is the life of each of the above if earth ballast existed?
Closed track.
Open track.

What is the relative life of the following in track, assuming same traffic and granite block 100?

1. Granite block. 100.
2. Trap rock block.
3. Medina sandstone.
4. Brick.
5. Asphalt block.
6. Wood block.
7. Amiesite.
8. Bitulithic.
9. Asphalt.
10. Macadam.

CONCLUSIONS AND RECOMMENDATIONS

1. Your committee has collected valuable and interesting data which are filed in the association office for the use of members and some of the more general of which are included with this report.

2. It is the opinion of your committee, for reasons hereinbefore stated, that it will not be practicable to compile any standard table that is generally applicable to the life of railway physical property at all places and under all conditions. Too many factors must be taken into consideration, notably the degree of maintenance, preservation, obsolescence and depreciation. All of these are certain to vary more or less in each individual case and should be separately investigated.

3. The custom of compiling figures to represent life of property in a particular case, when such figures are primarily based on investigation of other properties in different locations and under varying conditions, is unscientific and often unfair.

4. Comparisons can be fairly made only on a common ground. Therefore we recommend that, in order to insure uniformity and a reasonable degree of comparability, all in-

*Abstract of a report read before the American Electric Railway Accountants' and Engineering Associations, Chicago, Oct. 7-11, 1912.

vestigation and data bearing upon the life of property be based on a standard classification as cited in this report. We urgently recommend that members make conscientious and painstaking study of the life of various elements of railway physical property and that the lines herein laid down be followed. By such uniformity, and in this way alone, much valuable information may be elicited which will be of great value to the industry.

5. The committee has assembled from numerous compilations an extensive bibliography on the subject of life of railway physical property, including very generally the valuable literature on the subject. [This bibliography is submitted with the report as an appendix.] It is recommended to your attention in case information on the subject is desired.

6. The committee has also secured from Ford, Bacon & Davis a comprehensive table, the result of extensive research, giving in tabulated form very nearly all the published figures used in considering depreciation of railway property. [This is included in the report as an appendix.] It brings together from some fifty sources figures used by eminent authorities in putting into figures their conclusions upon this subject.

7. It is our opinion that the investigation of this subject before the committee should be continued so that all information may be properly compiled and kept up to date for ready reference at any time.

8. Your committee invites comment as to any phase of this report and will gladly welcome any suggestions, which will be given careful consideration. We shall also be glad to receive any data bearing upon the subject which may find proper place in the association's files.

REPORT OF THE COMMITTEE ON FEDERAL RELATIONS*

GEORGE H. HARRIES, CHAIRMAN; FRANK R. FORD, C. S. SERGEANT, F. W. BROOKS, L. S. CASS, RICHARD M'CULLOCH, R. I. TODD AND L. S. STORRS

The year's record fails to show any marked increase of friendliness in the relations of the federal government and the common carriers. The two parties are quite as close together as they were twelve months ago, but the intimate contact should still be regarded as a clinch rather than as an affectionate embrace. It was probably too much to expect—if anyone did so anticipate—that a session of Congress immediately preceding a presidential campaign would devote itself seriously and intelligently to the solution of a problem which can be solved only through the efforts of non-partisan and potent statesmanship. Not in any instance has there been effort to do anything more than to deal with symptoms No strong mind has probed for the cause in order that a real remedy might be developed and applied.

Investigation was the order of the congressional days throughout the entire session. Practically every committee of the House of Representatives was for the greater portion of the available time engaged in endeavors to find out something. Some of these committees—whether inadvertently or not—did secure a modicum of real information, but most of them were content with the asking of questions, answers to which would possibly provide them with information that might have political value.

But there is demand, not at all surprising, for more information. If the bills introduced and urged become effective in the near future, we shall have (in addition to commissions already provided for) joint special commissions to investigate controversies between employers and employees; to tell us what legislation is needed to protect trade and commerce against unlawful restrainst and monopolies; to present plans for the issuing of federal licenses to some corporations and (with many penalties) to prevent the issuance of licenses to other corporations; and new commissions will be established on railway construction and operation for the purpose of investigating the frequency of railroad wrecks and their prevention, and to do so many other things that they need hardly be cataloged. Also, the Interstate Commerce Commission will be required to write a treatise on industrial and transportation corporations and at about the same time will be called upon to investigate and to report upon the delays in transit of fruits and vegetables which are grown in eastern North Carolina, this latter in response to a strident demand by an eastern North Carolina congressman. While there undoubtedly are times when we are not altogether on terms of good fellowship with the Interstate Commerce Commission, yet there are occasions when we can afford to sympathize with it.

The average congressman, however, has no compassion whatever on the Interstate Commerce Commission when he wants to do anything to a railroad company. The latest suggestion would have the commission pass upon wages. Should a railway labor organization or a majority of the company's employees want an increase of wages the application is to be made to the commission, and its finding, subject to review by the Commerce Court, would stick. An attempt by the company to reduce wages would also be passed upon in like manner by the commission and the Commerce Court.

Another attempt to extend the usefulness (or whatever else it may be) of the Interstate Commerce Commission is found in the three pages of congressionally expressed thought that the commission should be required by examination, in co-operation with the Civil Service Commission, to pass upon the qualifications of all roadmasters, foremen and other persons employed by the carriers, to superintend construction, maintenance and repair of track, bridges, switches and signal apparatus. Employment of an uncertified man in any of the positions suggested would cost the railroad company real money.

One rather choice application of discriminatory regulation which may, in passing, be mentioned is to be found in the House resolution which had for its object an investigation by the Interstate Commerce Commission as to the freight rates charged by the common carriers engaged in interstate commerce on all articles commonly classed as luxuries and the non-essentials of life, with a view of subsequently raising the rates on such articles to a point where the earnings of said common carriers will allow the payment of a just and equitable wage to their employees.

A considerable proportion of congressional time was devoted to propositions which would materially affect the administration of business by common carriers. Most noteworthy was the persistent and almost successful effort to abolish the Commerce Court, but there was no lack of energy along other lines of particular interest to our industry. The propositions, for the most part, lacked novelty, yet here and there appeared a mischievous suggestion not previously discussed in any of the reports of your committee. Some of the legislators sought to prevent corporations or joint stock companies from removing cases from state courts to United States courts on the ground of diverse ownership. Others urged the enactment of anti-injunction bills. Trial by jury in contempt cases was urged, and one bill divided contempt into two classes—direct and indirect. Perhaps the most radical amendment to the revised statutes was that which, had it become law, would have read: "In no case tryable by a jury shall a court have power to take the case from the jury or direct the finding of the jury or to state his opinions as to the facts in the case to the jury."

Members of Congress have not lost interest in the important matter of the equipment operated by transportation companies. About all of the old suggestions have been renewed, and in addition thereto we have a bill which insists that headlights of not less than 1500 cp be installed on all locomotives, exemption being granted, however, to such locomotives

*Abstract of report read before the American Electric Railway Association, Chicago, Oct. 7-11, 1912.

as may be operated exclusively, as the bill puts it, "between sun-up and sun-down." One seeker after popular favor insists that unoccupied upper berths in Pullmans shall be closed, so that the patient who pays for a lower berth may enjoy as many cubic feet of space as though he had paid for a section. Failure to close the upper berth will cost $1,000, but whether the fine is to be assessed against the Pullman Company or the porter is not stated. That the inventor of special safety devices for the harmless operation of trains and cars may be able to induce public interest in his stock (both common and preferred) there are bills to compel the installation and use of those special devices. Perhaps because the mere bill serves the inventor's purpose much more satisfactorily than would a duly approved statute, the bills are as yet only bills and therefore not troublesome to the corporations which it is sought to coerce.

Legislative suggestions which could not reasonably be regarded as conservative have made their usual appearance. One bill opens up with "that all railroad, telegraph, telephone and express properties in the United States used in the transaction of interstate business be, and the same are hereby, declared to be the property of the United States government under the conditions of acquirement herein set forth." The attached financial scheme is at least interesting. A commission of twelve experts would be required to appraise the actual physical, tangible material, real and personal properties. Having determined the value on that basis, the commission would be authorized to issue 2 per cent bonds, in denominations of $50 and multiples thereof, to the aggregate value of the ascertained valuation of the said properties and would offer those bonds to be exchanged at a pro rata value for the securities of the companies of which possession was desired, such exchange to be based upon the actual value ascertained to be embodied in such certificates of ownership. Foreseeing the possibility that the owners of some of the properties in question might refuse to surrender them for the value offered, the bill provides that "in case of refusal it shall be the duty of the President to employ such means as may be necessary to take possession thereof."

Transportation companies, however, are not the only organizations to be acquired by a paternal government. Another projected measure proposes, first, to repeal the Sherman law and, second, to have the United States government take possession at physical value of any company, partnership, association or corporation whose marketable output of any product amounts to 40 per cent or more of the total output of that product for the United States. If the owners are averse to selling out, then the President may call upon the police or any other vigorous body which could be trusted to make the necessary transfer.

Congress, however, did some definite things, among them being the enactment of a law to create a commission on industrial relations. To say that this piece of legislation was well considered would be to overstep the bounds of average veracity. The act in question, which was approved Aug. 23, 1912, provides that the commission shall consist of nine persons (to be appointed by the President by and with the advice and consent of the Senate) "not less than three of whom shall be employers and not less than three of whom shall be representatives of organized labor." The statute requires that the commission "shall inquire into the general conditions of labor in the principal industries of the United States, including agriculture, and especially those which are carried on in corporate form; into existing relations between employers and employees; into the effect of industrial conditions on public welfare and into the rights and powers of the community to deal therewith; into conditions of sanitation and safety of employees and provisions for protecting the life, limb and health of the employees; into the growth of associations of employers and of wage earners and the effect of such associations upon the relations between employers and employees; into the extent and results of methods of collective bargaining; into new methods which have been tried in any state or in foreign countries for maintaining mutually satisfactory relations between employees and employers; into methods for avoiding or adjusting labor disputes through peaceful and conciliatory mediation and negotiations; into the scope and methods and resources of existing bureaus of labors and into possible ways of increasing their usefulness; into the question of smuggling or other illegal entry of Asiatics into the United States or its insular possessions and of methods by which such Asiatics have gained and are gaining such admission, and shall report to Congress as speedily as possible with such recommendation as said commission may think proper to prevent such smuggling and illegal entry. The commission shall seek to discover the underlying causes of dissatisfaction in the industrial situation and report conclusions thereon."

All of this vast inquiry, says the statute, must be reported finally to Congress not later than Aug. 23, 1915—less than three years in which to complete a series of investigations which, if made with any reasonable degree of thoroughness, would fully occupy a period of not less than ten years.

Under the time limitations of the act the commission will not be able to do more than skim the surface of the widely ranged topics set forth in the statutory program, and the probabilities all are that the conclusions as to all these matters, if presented within the time allotted, would neither deserve nor receive the respectful attention of thinking people.

As "a lamp unto our feet" is the report of the Railroad Securities Commission to the President of the United States, forwarded to Congress Dec. 11, 1911, and referred to the House committee on interstate and foreign commerce. The character of the commission is of such quality as to entitle its recommendations to the most careful consideration, and if the Congress fails to avail itself of the clearly expressed views of Arthur T. Hadley, Frederick N. Judson, Frederick Strauss, Walter L. Fisher and B. H. Meyer it will prove to the satisfaction of all thinking men that it does not desire that industrial and financial peace which is essential to national prosperity.

The report of the commision, which with President Taft's letter of transmittal is printed in full as an appendix, is the result of searching inquiry made through public hearings, through correspondence and through skilled personal investigation. The document is most illuminating. It deals concisely with all phases of an exceedingly complicated situation and does it tersely, yet with completeness. It makes the path to legislation so clear "that the wayfaring man, though a fool, may not err therein."

"Your committee is firmly of the opinion that while there should be no cessation on the part of the common carriers of efforts to secure from federal legislators and federal executives that fair dealing which must ultimately prevail, yet the scope of our missionary effort should be greatly broadened. The executive officials and the senators and representatives are, after all, merely the effects. The cause is the citizenship of the entire United States, and it is in the voting millions that the ruling power has its abiding place. Each member company should devote itself to sincere and assiduous educative effort throughout the area of its location and properly persuasive influence. Each man should reason with his neighbor. The ignorance of the individual should be displaced by that clear understanding which can come only as the result of at least a reasonable degree of personal knowledge. The wonderfully successful tour of President McCarter and his associates demonstrated beyond question the value of conference between those who know and those who do not know.

The appeal unto Caesar has not been effective. Our hope now lies in an appeal to the people of the Republic.

C. J. Mayer, president of the Electric Service Supplies Company, received many congratulations yesterday on his election to the executive committee of the Manufacturers' Association. Mr. Mayer's preferment has made a hit with everybody.

CHICAGO RAILWAYS METHODS FOR WASHING AND CLEANING CARS

There are two methods and uses of soap in the cleaning of street cars employed by the mechanical department of the Chicago Railways Company. One is the cleaning of cars while in service, and the method employed in this case must be such that the life of the paint and varnish is not shortened nor the polish or finish injured. The other is the cleaning of old cars or very badly soiled cars in preparing them for a new coat of paint or varnish. This method must leave the car free from grime, grease, stains and soap films. No cleaning agent must be used that makes a chemical change in the old point or varnish remaining on the car.

WASHING CAR WHILE IN SERVICE

The greatest care should be given to the selection of a soap that will give to the paint and varnish the longest life and insure that it will retain its brilliancy and firmness. A high-grade green oil soap made of a combination of vegetable oils gives the best results from the standpoint both of economy and of good results on the polished surfaces. The first requisite is to have the soap thoroughly dissolved in water.

The usual strength of the soap solution used in cleaning the interior and exterior of cars is 8 lb. of high-grade green oil soap dissolved in 50 gal. of water. This should be dissolved by heat, which should be applied for one hour or until the soap is dissolved. This makes a rich soap emulsion which can be freely used on highly polished surfaces. In the absence of heat or steam, dissolve the soap solution by considerable agitation. This may be done by rigging up an agitator in a barrel. Allow the solution to stand one night to "set" with the water thoroughly before using..

To clean ceilings, head linings, walls and perpendicular surfaces, suds applied with a stiff hair-bristle car scrub brush give excellent results. Work the soapsuds well into the cracks and crevices with a brush and rinse off immediately with clean water. using a sponge or hose.

If the car has furniture or upholstered seats apply the soap emulsion with sponges and wipe off with clean water and a sponge to prevent slopping. On all highly finished surfaces go over with a chamois immediately after wiping or washing off the dirt and suds with a hose. When the surface is dry it will take on a high polish with but little rubbing with a dry cheesecloth or piece of chamois.

In cleaning the outside of the car the skirt should be gone over first, working up, or else thoroughly wet the car with clean water so as to kill all dry dust. This method prevents streaking or spattering. Soapsuds and dry dust are hard on paint and varnish.

In scrubbing floors, cane seats or any surface lying flat, weaken the soap emulsion or solution by adding one-third more water. If the surface is not very dirty, add only half water. This will make it easier to remove the suds and dirt.

Use the same soap stock for scrubbing and mopping the floors of cars as is used on the painted surface. Nothing is gained by using rough scrub soaps or powders and much is lost when the paint on the sides is destroyed.

WASHING CARS IN MAKE-READY FOR NEW COAT OF PAINT AND VARNISH

The essential in the soap used here is to have the quality of the soap good enough not to affect the paint or varnish, yet have the kind of soap that is easily removed. This will prevent crawling of the varnish. The soap should not be a filled soap. Such soap rinses well, but carries soda in the filler. A good, pure castile soap works well. Dissolve thoroughly 10 lb. of soap in a 50-gal. tank or barrel by heating (or steam) for one hour so as to form a good emulsion of uniform consistency. The car washers use this soap solution from 1-gal. pails with a stiff hair sudsing or car scrub brush. They dip into the soap and coat over the surface to be cleaned. After covering considerable surface the washer goes over it with soapsuds and No. ½ pulverized pumice stone. The stone is worked well into all crevices and corners. The scrub brush is used to apply the pumice by dipping first lightly into the liquid soap solution and then into the pumice stone, the combination forming a paste on the brush. If this is thoroughly applied it will loosen all grime, grease and dirt. Before the suds "sets" they are removed with clear water, using a hose or sponge. When the process is complete the car is ready for a new coat of paint or varnish.

In cleaning the outside of the car apply suds and pumice to the skirt first and work up, or else wet the car down with clear water to prevent streaking. If the proper soap is used, this method does not affect the firmness or texture of the old paint or varnish remaining on the car, and a highly finished headlining is not injured.

Three gallons of solution of soap of this strength is required to clean the Pullman type of car used by the Chicago Railways. If the car is very much soiled or has been in service long, 4 gal. will be required to clean both interior and exterior, including the deck, roof and trucks.

The average cost for labor to wash the Pullman type car is $3.80. The cost of soap is the smallest item. The highest grade of soap works so much better and more easily than low-grade soaps that the extra labor required to handle cheap soaps is often more than the good grade of soap costs.

ESSENTIALS IN GOOD SOAP

The mechanical department of the Chicago Railways Company requires that a high grade of soap shall show no alkaline reaction on test. It should not, however, contain over one-quarter of 1 per cent of free alkali. No filler or adulterant should be in the soap, as fillers must necessarily carry alkali under cover. A pure vegetable oil makes the best hard or soft potassa soap.

Free alkali or active soda cleans by making a chemical change. Pure soap cleans by the emulsion process and no other perceptible chemical change takes place. If strong soap, alkali or active soda in any form is used in cleaning, the outer surface of the old paint or varnish necessarily must be affected, being partly saponified. The new paint or varnish in this case will not wear as long as it would if the car had been cleaned properly. It is essential, both in "the service car washing" and the "before painting washing," that the agency used for cleaning shall not be a chemical process but a pure soap process, if the maximum life of paint and the brilliancy of the highly polished surface is to be retained.

Recent agitation in favor of center entrance cars, together with the large number of novel developments of that general idea which have been brought out during the past year, as stated by the *Tramway Bulletin,* call attention to the fact that the city of Denver is really the home of the center-entrance car. This, of course, does not mean that the first center-entrance car was operated in Denver, but that this city was the first to make use of the center entrance to an extended degree. The first Denver center-entrance car, or, as it is called there, side-entrance car, was built about 1898 and was the result of setting end to end an old 16-ft. closed motor car and an open trail car of about the same length, two main side sills splicing the bodies together. The entrance was of double width and had fixed steps below it by which passengers reached the street. The general design was perpetuated, and the present center-entrance car differs only in its general modernization.

One question, at least, in regard to the increased cost of living has been settled by the experience of holding the convention near the Stock Yards. The high price which the delegates have to pay for beef in their home cities is not due to high charges for transportation or extortionate profits on the part of the retailers.

Among the Exhibits

Edwin L. Reed and Captain James, of Edward L. Reed & Company, labor experts, Chicago, Ill., have been attending the convention.

* * *

William H. Dickinson, formerly with the Griffin Wheel Company, has joined the selling forces of the Railway Materials Company, Chicago.

* * *

The Sherwin-Williams Company, Cleveland, is ably represented at the convention by a corps of its sales organization headed by E. M. Williams.

* * *

The T. H. Symington Company is ably represented at the convention by several members of its staff, including S. L. Kamps and A. H. Weston.

* * *

A sign reading "Kewanee Specialties" is shown in the National Tube Company's booth. This is made entirely from "Kewanee" unions, valves and other "Kewanee" products.

* * *

The Eary Register Company, Dayton, Ohio, space 135, is exhibiting a new style of waybilling machine which is entirely automatic in operation and gives full registration of bills. The exhibit includes a perfected type of dispatcher.

* * *

Charles S. Cook, manager of the railway and light department of the Westinghouse Electric & Manufacturing Company, who years ago was manager of the Chicago office of the company, attended the convention, accompanied by Mrs. Cook.

* * *

Among the headlights exhibited by the Crouse-Hinds Company, of Syracuse, are several new types. These include an incandescent flush type for mounting within the dash and a a new Luminous Junior lens type having the mechanism in the back.

* * *

Nic Le Grand and others have pleasure in confirming the report that the St. Louis Car Company has received an order from the Stone & Webster Engineering Corporation (for the El Paso Railway) for six sets of No. 47-B short-wheelbase city car trucks.

* * *

The Near-Side Car Company has disposed of part of its exhibit at this convention. The Lincoln Traction Company has purchased the double-truck near-side car which is on exhibition, and it has ordered two more cars of the same type for early delivery.

* * *

Calvert Townley, assistant to president of the Westinghouse Electric & Manufacturing Company, who for many years has been known in electrical circles, spent the entire week at the convention. He was greatly interested in its deliberations and was in almost constant attendance.

* * *

In space 515 the National Washer Company, of Newark, N. J., is exhibiting all types of its curtain fixtures, car curtains, sash locks and sash balances, anti-sash rattlers and lock washers. All of these fixtures are mounted on full-size models of car windows which can be operated as in actual service.

* * *

The Ohio Brass Company, spaces 201, 203, 233 and 235, has a number of new car equipment devices on display, among the most interesting being the automatic air-connecting type of Tomlinson coupler, trolley catcher, trolley base and wheels and harps. Something new in rail bonding is being shown to the delegates.

The exhibit of the Scientific Railway Appliance Company, Chicago, consists of a special air-brake valve handle, auxiliary valve and an air-brake pressure regulating valve. The combined mechanism automatically turns off the power, rings the gong, deposits sand and applies the brake, all in one operation and in proper sequence.

* * *

This is the third convention at which the shim brake-slack adjuster has been exhibited. W. H. Sauvage, the inventor of the adjuster, is present at the convention in its interest as well as that of the Standard Coupler Company, which is marketing this equipment. Mr. Sauvage is also talking about the Acme adjuster, which is in use on all the Harriman lines.

* * *

The International Steel Tie Company, Cleveland, spaces 131 and 133, is showing types of steel ties for various conditions. These include a tie for paved street construction cover, a tie to be installed with ballast and a model of crossing ties of the type now being installed by the Union Traction Company of Indiana where its railway crosses the Big Four at Muncie, Ind.

* * *

The exhibit of the Simmen system of railway signaling as made by Northey-Plummer, Ltd., Indianapolis, Ind., and Toronto, Ont., spaces 429 to 431, is attracting attention because of the working exhibition of the full-size dispatcher's table, cab signal equipment and a miniature railway train demonstrating the automatic recording of the train movements in the dispatcher's office.

* * *

Charles I. Earll is attending the convention in the interest of the Earll trolley catchers and retrievers, which are exhibited in the space of the Lord Manufacturing Company. Mr. Earll has just returned from Europe, where he has been during the summer studying subway construction in London, especially the difference in the method of construction in Europe and the United States, with a view of applying the best in European engineering practice to the construction of the present subways in New York.

* * *

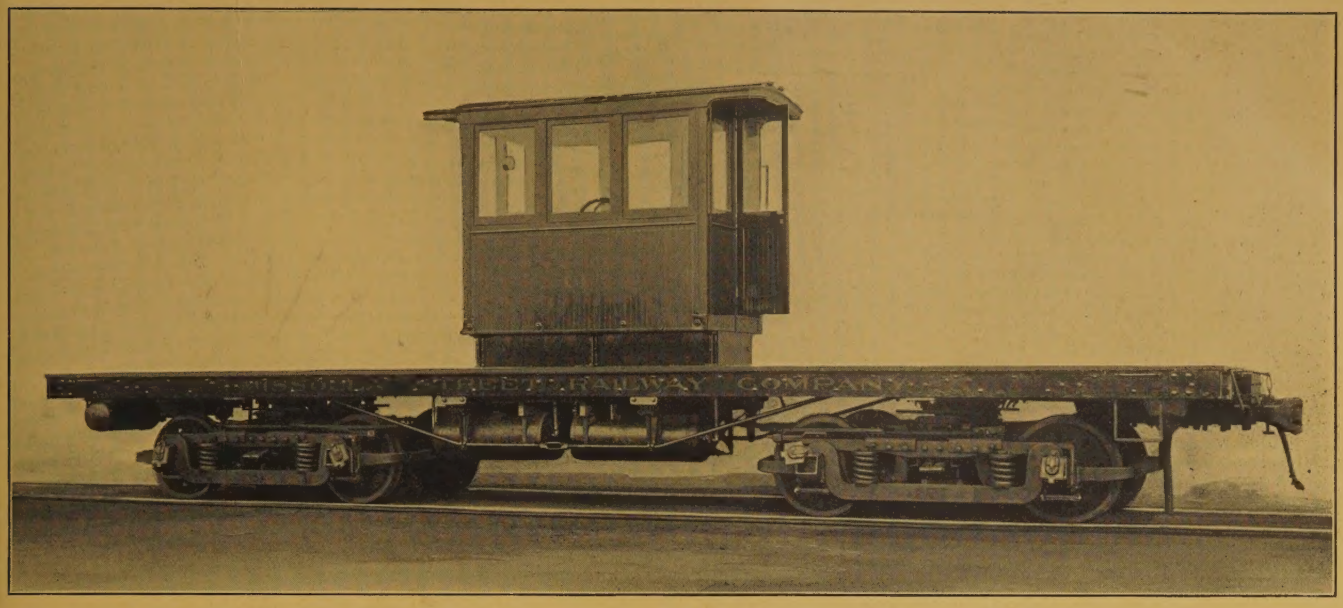
In the aisle among the rolling-stock exhibits the General Vehicle Company of Long Island City, has on exhibition one of four storage-battery tower wagons recently sold to the Milwaukee Electric Light & Railway Company. On a 2-ton chassis is mounted a Trenton tower; the wagon is equipped with a forty-four-cell, seventeen-plate General Vehicle lead battery; the motive power of the wagon is equivalent to a 40-hp gasoline engine; it has a range of 45 to 55 miles on one charge; speed ranges from 10 to 20 miles per hour. A number of these wagons have been sold to electric railways in the United States and foreign countries.

* * *

The Cincinnati Car Company has an interurban steel side-entrance car which is attracting a great deal of attention on the exhibition car track. This is one of an order of eleven cars of the same type being built for the Seattle, Renton & Southern Railway, Seattle, Wash. The length is 50 ft. and the total weight 49,000 lb. The entrance platform is fitted with railings for prepayment operation, and the interior equipment is especially designed for easy clearing. A notable feature in this connection is an arrangement by which the seats may be tilted to a vertical position to secure ready access to the floor underneath. The control is the Westinghouse multiple unit for single unit or for train operation.

CLOSE OF EXHIBITION

The exhibit will be formally closed at 2 o'clock this (Friday) afternoon. As usual, the rule will be enforced that dismantling and removal of exhibits must not be started until after 2 o'clock.



¶ Where both passenger and baggage traffic grows gradually heavier, it means the purchase of more cars. Switching movements become more frequent, and it will undoubtedly become necessary to move freight in quantity over the road. Use a baggage car, equipped with powerful motors, as a locomotive. The load of baggage and freight give enough wheel-load for the necessary tractive effort. Obviously, one powerful car like this, and doing its own work in addition to hauling, is more economical to operate than the same number of individual or multiple-unit motor cars. Such operation affects net earnings—really five cars and a locomotive in one—and such Brill baggage car-locomotives are running with profit today.

¶ Roads which are constantly engaged in some manner of improvement or construction work appreciate the value of out-and-out construction cars. Brill construction cars may be arranged to best suit the conditions under which they may be called upon to work. Some have cabs at either end, with double and elastic crane equipment; others have been built with one central or end cab and crane equipment to meet special purposes. Cars of this type may also be used for the transportation of heavy or bulky revenue freight where this shows itself to be profitable—and such Brill cars are running with profit today.

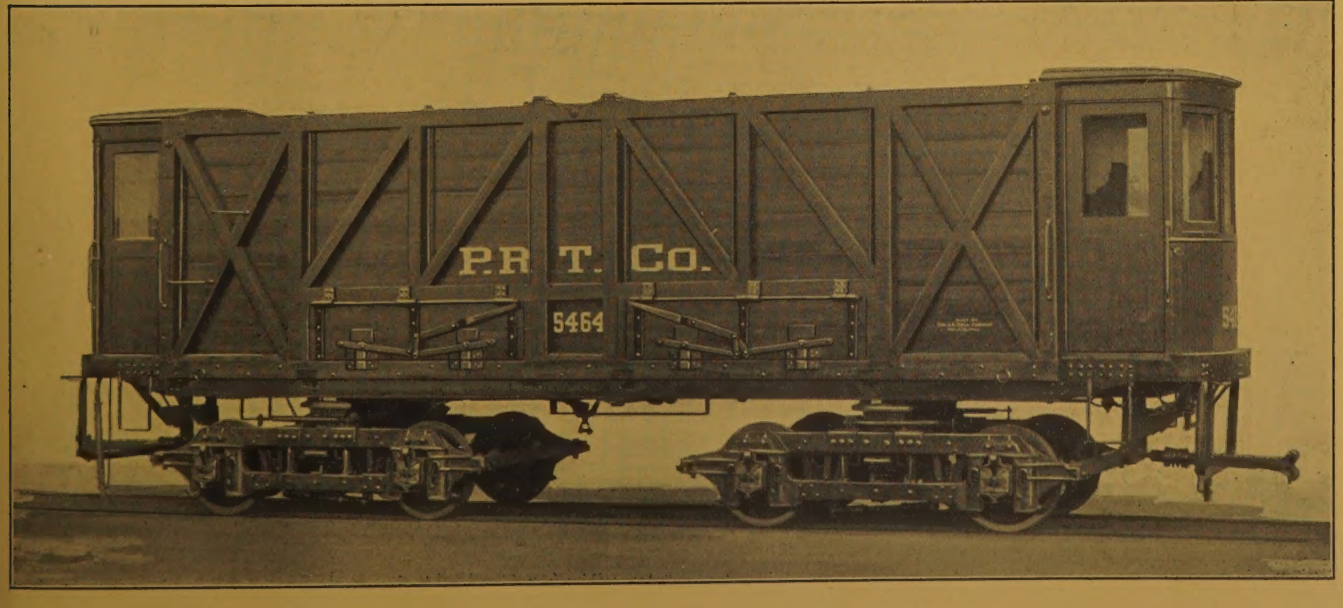
¶ Special types of cars for the transportation of coal and ashes are invaluable where much of this manner of material must be handled. They may have side or end doors, or, where the electrical equipment is not interfered with, may have hopper or drop bottoms—and many such Brill cars are running with profit today.

¶ Any of these cars may be built of wood, steel or part steel, and the underframing may be of either material. The design is in accord with the best engineering practice—places the weight where it works and eliminates it where it is unnecessary, for mere weight cannot be translated into strength.

¶ Some of these Brill cars may be able to affect the net earnings of your road. Our whole engineering staff is at your disposal.

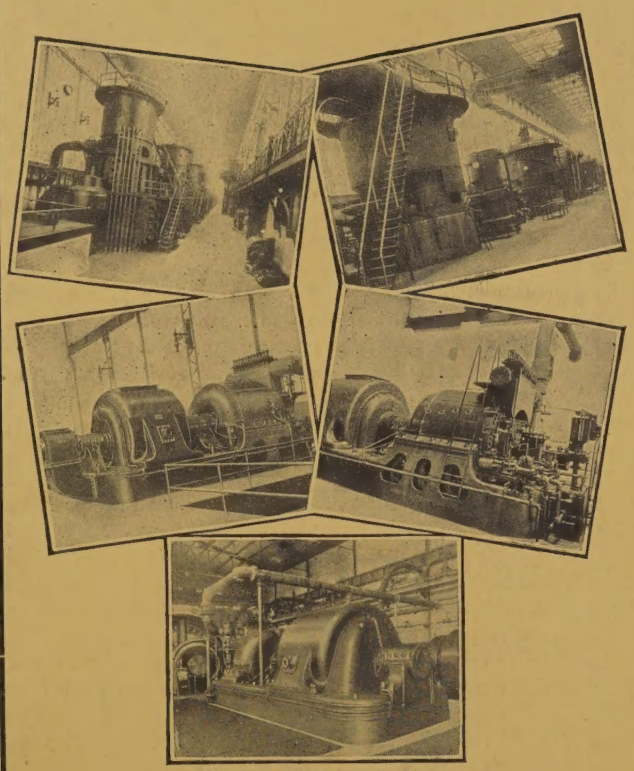
THE J. G. BRILL COMPANY

PHILADELPHIA **PENNSYLVANIA**



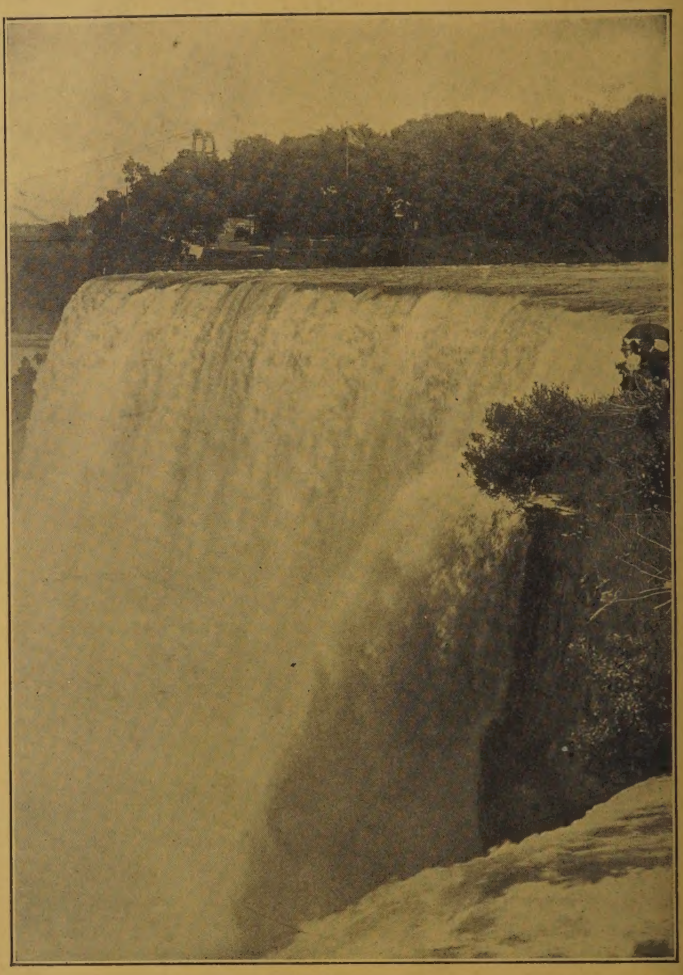
The Power of Niagara in Curtis Steam Turbines

CHICAGO



Representative Installations

NIAGARA



In and about the city of Chicago alone, the electric power derived from Curtis steam turbines approximates that developed from the Falls of Niagara.

The Curtis Turbine---The American Standard

General Electric Company

Largest Electrical Manufacturer in the World
General Office: Schenectady, N. Y.
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For Texas and Oklahoma business refer to General Electric Company of Texas,—Dallas, El Paso, Houston and Oklahoma City
For Canadian business refer to Canadian General Electric Company, Lt'd, Toronto, Ont.

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